AN EARLY PALEO-INDIAN SITE NEAR PARKHILL, ONTARIO

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Abstract

This study reports on the information recovered from the Parkhill Early Paleo-Indian (fluted point) site in southwestern Ontario. It is the type site of what has been called the Parkhill complex or phase in the central Great Lakes area. Dating to the end of the last ice age, Parkhill is located just inland from the southern margin of Lake Huron. It represents the activities of the earliest human occupants to enter Ontario as the continental glaciers retreated to the north. Found and investigated in the early 1970s, at the time it was the first major site of this age and affiliation discovered in Ontario and only the second to be discovered in Canada after the Debert site in Nova Scotia reported in the 1960s. Parkhill is a large archaeological site, made up of at least nine concentrations of lithic debris distributed over an area of some 6 ha in cultivated fields. These large sites are the rarest of Paleo-Indian sites and only one other such site is now reported for Ontario. As a result of the above factors, the site was named of *National Historic Significance* by the Historic Sites and Monuments Board of Canada.

The Parkhill site is situated just north of a modern creek at a major right-angle bend in an abandoned shoreline which represents an early lake level above that of modern Lake Huron. The abandoned lake level has long been believed to have been occupied by an earlier pro-glacial lake at around 11,000 to 10,400 radiocarbon years B.P. and later, after a period of low water, below modern levels, by a post-glacial Nipissing phase lake at ca. 5500-4500 B.P. Parkhill represents only one of at least 17 fluted point sites in the area above and ringing that lakeshore, most of which are assignable to the Parkhill Phase. The fact that no fluted point sites are known below that lake level across all of southern Ontario suggests they were occupied contemporary with the earlier lake level (e.g. in the 11th millenium B.P.) and this age estimate is consistent with radiocarbon dates on such sites throughout North America.

Excavations were carried out at Parkhill primarily in three of the site areas (B, C, and D). The other areas are known solely through surface collection off of ploughed fields in the 1970s. In addition to the excavations, attempts were made to recover information on the geological and paleoenvironmental setting of the site. These investigations occurred both at the site itself and by a series of boreholes taken up the creek valley south of the site. The geological and paleoenviromental studies confirm what has long been suspected: that a lake level above modern existed beside the site during the estimated time of its occupation between ca. 11,000 and 10,400 B.P. Actual dated lake bottom deposits representing this high water level were recovered some 1.2 km up the creek valley south of the site. These data indicate the site was located adjacent to a large estuary of that lake at the time it was occupied. Although such a high water level had long been expected based on data from elsewhere in Ontario to the north, these deposits represent the first confirmed and dated evidence of that lake level (usually referred to as Main Lake Algonquin but perhaps attributable to a post-Algonquin Lake Ardtrea) in the southern Lake Huron basin. Analyses of pollen and other paleoenvironmental evidence such as fossil beetles from the deposits related to this lake, along with evidence from work elsewhere in

Ontario, indicate that the site was situated in a spruce-dominated landscape through much of the estimated time of the occupation. Significant amounts of non-arboreal pollen suggest the site was most likely in an open woodland, rather than a closed forest, environment.

Although cultural features were encountered at the site, the main source of information on the inhabitants are the recovered stone artifact assemblages -- all that usually survives on sites of this age. Also, the collections include the largest known samples of certain tool forms yet reported for Ontario sites such as finished fluted points, miniature points made on channel flakes, and trianguloid end scrapers. They represent a major building block in documenting and understanding Paleo-Indian tool kits. Therefore, the stone artifacts, including both tools and debris from manufacture and repair, were subjected to very detailed analyses. Besides summary descriptions of the 330 stone tools and preforms recovered, as an aid to future comparative studies, measurements and attribute states for each individual item recovered are presented in appendices, and almost the whole assemblage of formed tools is illustrated.

The artifact descriptions focus on explaining patterned artifact variability in the assemblage in terms of a series of interacting immediate/proximate causes such as raw material selection processes, manufacturing procedures, hafting or non-hafting of implements, resharpening and so on. The main stone material used at the site is Collingwood chert from the Fossil Hill formation. This material, which is the dominant one employed at all Parkhill Phase fluted point sites in the area, had to be procured and brought to the site from locations 175-200 km to the northeast in southcentral Ontario. Smaller amounts of material from other locations, notably Bayport chert from the vicinity of Saginaw Bay in Michigan, attest to interaction with areas farther afield. Detailed models of primary core reduction procedures are developed which suggest the inhabitants used standardized core forms of both a conical and bifacial shape. Blanks selected from the reduction products were made into a very wide variety of implements, most of which are highly retouched. The assemblage not only provides documentation of some well-known artifact forms, such as fluted points, but also provides information on some other much rarer and less widely recognized tool forms, such as large bifaces resharpened by alternate edge bevelling, backed bifaces, hafted perforators, large concave side scrapers with spurs, and large parallel-sided end scrapers. The almost 6000 pieces of flaking debris recovered are notable for their small size, with only 29 pieces weighing over 1 g each. These data indicate that primary reduction activities were minimized. One presumes the earlier wasteful stages of core reduction were carried out only near toolstone sources to maximize the portability and usability of material to be transported some distance. A notable component of the debris assemblage is a good sample of almost 200 channel flakes derived in point fluting. These flakes, and the recovered preforms, allow the suggestion that failure rates in the difficult fluting operation were rather low and probably less than 10-15% at this site.

Detailed information is provided on the spatial distributions of artifacts, debris and features in the three main excavated areas B, C and D. Certain patterns seem evident in these data such as a tendency for debris to concentrate around features and for tools such as piercers or

gravers to occur in multiples, perhaps because they had short application lives such that more than one tool was needed to carry out a particular task.

An examination of the overall arrangement of all Parkhill site areas, suggests that it is unlike most of the previously reported large, multi-locus, Great Lakes/Northeast, Paleo-Indian sites such as Fisher (Ontario), Nobles Pond (Ohio), Bull Brook (Massachusetts) and Vail (Maine). The distribution of different artifact and debris forms by Parkhill area, clearly allows one to recognize two groups of those areas. One group, consisting of areas A/J, B, C and E, is notable for having the highest percentage of fluted bifaces ever reported from the over 50 fluted point sites or site areas now known in the central Great Lakes. They are very specialized work areas of a *relatively* small size (ca. 200 to 400 m^2) where fluted biface rehafting (as indicated by discarded point bases/ears) and manufacture (as indicated by channel flakes) was emphasized almost to the exclusion of all else. All of these site areas are in a linear array along the western site margin, literally paralleling the adjacent lake shore and looking across the former narrow lake estuary to the south/southwest. The second group, consisting of the remaining five site areas (D, G, H, I, K), are irregularly distributed across the eastern half of the site away from the lakeshore, and are quite different. Minimal excavation and small sample sizes places some constraints on interpretations, but these areas have more diverse tool inventories and were the scene of a wider array of domestic activities with unifacial tool use being more common. These areas seem to vary in size but most are much larger than the western site areas, and the most intensively investigated (Area D) exceeds 2000 m^2. Since Area D alone is almost three times the size of the largest previously reported whole site in southwestern Ontario (Thedford II), a relatively large occupying group is suggested.

Eastern Area D can be linked to one of the western site areas (Area B) by artifact cross-mends suggesting they were used at the same time. A parsimonious interpretation of the site as whole, reinforced by areal variation in raw material frequencies and in point morphology, is that it was used on several occasions and that each occupation may have involved use of one eastern general domestic activity locus and one western specialized fluted point maintenance and production area. The western areas are situated lining the strandline with a good view along the shoreline to the west and north. These may have been ideal areas to watch for game approaching along the lakeshore while preparing or maintaining weaponry (hence, their quite specialized assemblages) while the eastern areas were actual domestic camp locations. Caribou have long been suggested to have been a favourite target of Great Lakes Paleo-Indians based on environmental reconstructions and recoveries of highly fragmentary remains of that species at other sites such as Udora (Ontario) and Holcombe (Michigan). Parkhill was located just to the north of a narrow estuary in a situation identical to that employed to hunt caribou by modern hunters. These locations are ideal for intercepting caribou as the animals are slowed and easier to harvest while crossing such waters. As such, one can suggest that the Parkhill site as a whole seems to fit the stereotype often applied to all large Paleo-Indian sites: an aggregation site where people seasonally gathered for the intercept communal hunting of game such as caribou.

Résumé

Cette étude rend compte de l'information tirée du site paléoindien ancien (pointe cannelée) de Parkhill situé dans le sud-ouest de l'Ontario. C'est le site qui a servi à nommer le complexe ou phase de Parkhill localisé au centre de la région des Grands Lacs. Remontant à la fin de la dernière glaciation, Parkhill se trouve légèrement à l'intérieur des terres par rapport à la limite orientale du lac Huron. On y a détecté les activités des premiers êtres humains à pénétrer dans l'Ontario au moment où les glaciers continentaux se retiraient vers le nord. Découvert et fouillé au début des années 1970, il constituait à cette époque le premier site majeur de cet âge et de cette affiliation en Ontario et seulement le second découvert au Canada après le site de Debert en Nouvelle-Écosse, analysé en 1960. Parkhill est un grand site archéologique, comportant au moins neuf concentrations de dépôts lithiques réparties sur une superficie d'environ 6 hectares de champs cultivés. Ces grands sites se rangent parmi les sites paléoindiens les plus rares; on n'en connaît qu'un seul autre en Ontario. Pour ces raisons, la Commission des lieux et monuments historiques du Canada a considéré qu'il revêtait une signification historique nationale.

Le site Parkhill est situé juste au nord d'un ruisseau moderne à un coude important d'une ancienne rive qui correspond à un ancien niveau du lac, plus élevé que celui du lac Huron moderne. On a longtemps cru que le niveau abandonné du lac avait été occupé par un ancien lac pro-glaciaire vers 11 000 ou 10 400 ans BP et, plus tard, par un lac post-glaciaire de la phase de Nipissing vers 5 500-4 500 BP après un période de niveau d'eau inférieur au niveau moderne. Parkhill ne représente qu'un seul des 17 sites, au moins, à pointes cannelées qui se situent dans les concentrations susmentionnées entourant ce littoral, la plupart attribuables à la phase de Parkhill. Le fait qu'aucun site à pointes cannelées ne soit connu au-dessous du niveau du lac dans tout le sud de l'Ontario permet de croire qu'ils étaient contemporains de l'ancien niveau du lac (c'est-à-dire au 11e millénaire BP). L'estimation de cet âge est cohérente avec les datations obtenues par le radiocarbone des autres sites du même genre connus dans toute l'Amérique du Nord.

On a effectué des fouilles principalement dans trois aires du site Parkhill (B, C, et D). Les autres aires sont connues seulement par des collections de surface ramassées dans des champs cultivés dans les années 1970. En plus des fouilles, on s'est efforcé de récupérer des informations sur le milieu géologique et paléoenvironnemental correspondant au site. Ces recherches ont eu lieu à la fois au site lui-même et dans la vallée du ruisseau au sud du site où on a effectué une série de forages. Les études géologiques et paléoenvironnementales confirment ce qu'on soupçonnait depuis longtemps à savoir que, près du site, le niveau du lac était supérieur au niveau moderne durant le période escomptée de son occupation entre environ 11 000 et 10 400 BP. Des dépôts datés provenant du fond du lac actuel représentant ce niveau élevé de l'eau ont été récupérés à quelque 1,2 km du ruisseau au sud du site. Ces données indiquent que le site jouxtait un large estuaire de ce lac au moment de son occupation. Quoiqu'un niveau aussi élevé du lac ait été anticipé sur la base de données provenant plus au nord ailleurs en Ontario, ces dépôts représentent le premier

enregistrement confirmé et daté du niveau de ce lac (habituellement appelé le lac Algonquin principal mais peut-être attribuable au lac Ardtrea post-Algonquin) dans le sud du bassin du lac Huron. Des analyses palynologiques et d'autres données paléoenvironnementales, notamment des coléoptères fossiles provenant de dépôts reliés à ce lac, ajoutées aux données de travaux effectués ailleurs en Ontario, indiquent que le site était situé dans un milieu dominé par des épinettes pendant une bonne partie de la période de l'occupation. Une quantité importante de pollens non-arboricoles laisse croire que le site se trouvait plus vraisemblablement dans un milieu de forêt claire, plutôt que de forêt fermée.

Même si le site comportait des structures d'origine culturelle, la principale source d'information sur les habitants dépend de l'assemblage des pièces en pierre - en fait, tout ce qui survit habituellement dans les sites de cet âge. En outre, les collections comprennent le plus grand échantillon de certaines formes d'outils provenant des autres sites de l'Ontario, notamment des pointes cannelées finies, des pointes miniatures sur chutes de cannelures et des grattoirs trianguloïdes. Ces objets constituent des éléments exceptionnels pour la documentation et la compréhension de l'outillage paléoindien. Les vestiges en pierre, y compris les outils, les déchets de taille et de la remise en état des outils ont donc été soumis à des analyses très détaillées. En plus de la description sommaire des 330 outils et ébauches récupérés, les mesures et les caractères de chaque outil individuel sont présentés en appendice et presque tout l'assemblage des outils de diverses formes est illustré, en vue d'études comparatives éventuelles.

La description des pièces vise à donner un sens à la variabilité des pièces de l'assemblage en faisant appel à une série de causes immédiates/rapprochées interagissantes, notamment les critères guidant le choix de la matière première, les étapes du façonnage, l'emmanchement ou non des instruments, le ravivage et ainsi de suite. Le principal matériau lithique utilisé au site est le chert Collingwood provenant de la formation Fossil Hill. Ce matériau, qui est dominant dans tous les sites à pointes cannelées de la phase Parkhill de cette aire, devait être obtenu et apporté au site depuis des endroits situés à 175-200 km dans le secteur nord-est du centre sud de l'Ontario. De plus petites quantités de matériau provenant d' autres endroits, notamment le chert de Bayport situé dans le voisinage de la baie Saginaw au Michigan, témoignent des interactions susceptibles d'exister avec des populations vivant dans des aires encore plus éloignées du site. On a mis au point des modèles détaillés illustrant les méthodes adoptées pour le débitage des nucléus, modèles qui permettent de croire que les artisans utilisaient normalement des nucléus de forme conique ou bifaciale. Les éclats-supports choisis parmi les produits du débitage étaient façonnés en une très grande variété d'instruments, dont la plupart comportaient beaucoup de retouches. L'assemblage non seulement fournit des renseignements reliés à des formes de pièces bien connues, notamment les pointes cannelées, mais aussi fournit des renseignements reliés à des formes d'outils beaucoup plus rares et moins bien connues, notamment de grands bifaces ravivés par le biseautage alternant des bords, des bifaces à dos, des perçoirs emmanchés, de grands grattoirs concaves munis d'ergots, et de grands grattoirs à bords parallèles. Les quelque 6 000 éclats, ou à peu près, de déchets de taille récupérés sont caractérisés par leur petite taille, dont 20 morceaux seulement pèsent plus de 1 g.

chacun. Ces données indiquent que les activités reliées à l'aménagement des nucléus étaient minimes. On présume que les premières étapes de la préparation des nucléus entraînant des déchets inutiles étaient effectuées seulement près de la source de matière première pour optimiser le caractère portable et utile du matériau qui devait être transporté sur une distance appréciable. Un élément remarquable constitutif de l'assemblage des déchets de taille est un bon échantillon de presque 200 chutes de cannelures provenant de pointes cannelées. Ces chutes et ces ébauches permettent de croire que le pourcentage des essais ratés lors de la difficile étape du cannelage était plutôt bas et se situait probablement à moins de 10-15% dans ce site.

On a obtenu une information détaillée de la distribution spatiale des pièces, des déchets et des structures dans les trois principales aires B, C et D. Une certaine tendance semble évidente dans ces données, notamment la tendance des débris à se concentrer autour de structures et la tendance des outils, tels que perçoirs ou becs, à constituer des outils multiples, peut-être parce que leur vie utile était si courte que plusieurs outils étaient nécessaires pour effectuer une tâche particulière.

Un examen de l'agencement général des aires du site Parkhill laisse croire que la situation ne ressemble pratiquement à celle d'aucun autre grand site paléoindien connu dans les Grands Lacs/Nord-Est et comportant plusieurs aires, notamment Fisher (Ontario), Nobles Pond (Ohio), Bull Brook (Massachusetts), et Vail (Maine). La distribution des objets-témoins et des déchets par aire à Parkhill permet de classer ces aires en deux groupes. Un groupe, comprenant les aires A/J, B, C et E, se caractérise par un haut pourcentage de bifaces cannelés inégalés parmi plus de 50 sites à pointes cannelées ou sites à aires jamais connus dans le centre des Grands Lacs. Ce sont des aires de travail très spécialisées, relativement petites (environ 200 à 400 m²) où l'emmanchement des bifaces cannelés (tel qu'indiqués par le rejet de la base/barbe des pointes) et le façonnage (tel qu'indiqué par les chutes de cannelures) étaient accentués presque plus que toute autre chose. Toutes ces aires sont alignées à la limite occidentale du site, littéralement en parallèle avec la rive du lac adjacent et donnant une vue sur l'ancien estuaire étroit du lac au sud/sud-ouest. Les cinq autres aires du site (D, G, H, I, K), formant le deuxième groupe, sont irrégulièrement distribuées sur la moitié orientale du site éloignée du littoral du lac, et sont plutôt différentes. Les fouilles limitées et la petite taille des échantillons restreignent en quelque sorte l'interprétation. On remarque cependant que ces aires correspondent à un outillage plus varié et étaient vraisemblablement la scène d'une plus grande variété d'activités domestiques où on se servait surtout d'outils unifaciaux. La taille de ces aires semblent varier mais ces dernières sont pour la plupart beaucoup plus amples que les aires occidentales du site, et l'aire la plus complètement fouillée (l'Aire D) excède 2000 m². Puisque l'Aire D à elle seule a presque trois fois la taille du plus grand site connu du sud-ouest de l'Ontario (Thedford II), on croit à une occupation par un groupe relativement nombreux de gens.

L'Aire orientale D peut se relier à l'une des aires occidentales sud du site (Aire B) grâce au raccord des pièces, raccord qui indique que ces aires étaient utilisées en même temps. Une interprétation minimale du site entier, renforcée par la variation des aires quant à l'importance des matières premières et à la morphologie des pointes, veut que le site ait été utilisé à plusieurs occasions et que chaque occupation a pu impliquer un lieu général d'activités domestiques dans l'aire orientale et un lieu spécialisé de façonnage et de remise en état des pointes cannelées dans l'aire occidentale. Les aires occidentales suivent la ligne du rivage et comportent une bonne vue du littoral à l'ouest et au nord. Ces dernières ont pu avoir été des aires idéales qui permettaient aux chasseurs, tout en préparant ou remettant leurs armes en état(d'où les assemblages plutôt spécialisés) de surveiller le gibier qui s'approchait le long de la rive; par contre, les aires orientales constituaient le lieu réel du campement domestique. La reconstitution environnementale et la nature des restes très fragmentés de caribous récupérés à d'autres sites, notamment à Udora (Ontario) et Holcombe (Michigan), nous ont permis de croire depuis longtemps que les caribous ont constitué la cible privilégiée des Paléoindiens des Grands Lacs. Parkhill était situé juste au nord d'un estuaire étroit à un endroit qui ressemblait à celui qu'utilisent les chasseur modernes pour chasser le caribou. Ces endroits revêtent un caractère idéal pour l'interception des caribous car les animaux sont ralentis et plus facilement abattus lorsqu'ils franchissent ce genre de plan d'eau. À ce titre, on peut suggérer que le site Parkhill en général semble correspondre au stéréotype souvent appliqué à tous les grands sites paléoindiens : un site de rassemblement où les gens se réunissaient de façon saisonnière et où les membres de la communauté participaient à la chasse au gibier, notamment le caribou.

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The site collections and records from the Parkhill site are housed in the Great Lakes archaeology laboratory, Department of Anthropology, University of Western Ontario, London, Ontario, Canada.

Chris Ellis and Brian Deller, December, 1999

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PART I: SITE CONTEXT AND EXCAVATIONS

CHAPTER 1

BACKGROUND by Christopher Ellis and D. Brian Deller

Introduction

In this study, we report on investigations at the Parkhill site, an Early Paleo-Indian site in southwestern Ontario. This site was the first large, multi-area, fluted point producing locality to be discovered and to receive an extensive degree of excavation (1973-1975) in the Great Lakes area. Only five of these large sites have been reported in the Great Lakes region as a whole and only two such sites are known in Ontario. As will be detailed below, it provides significant new information on both the spatial layout of these large sites and their environmental settings which is potentially very informative about how Paleo-Indian groups organized themselves on the landscape. As well, there is an excellent assemblage of Paleo-Indian tool forms, including the largest collections of finished points, trianguloid end scrapers, miniature artifacts and other artifact forms yet reported from an Ontario site. As such, it provides data essential to our documentation and understanding of Paleo-Indian tool kits and the development of adequate time-space constructs. These facts, along with the knowledge that much of the site remains unexcavated and thus, presumably preserved for future study (it has been subject to the deprivations of relic hunters in recent years), led to the site being declared of "National Historic Significance" by the Historic Sites and Monuments Board of Canada. Although several preliminary summaries of the site, as well as some detailed ancillary studies of certain specific aspects, are available (Deller 1980a; Deller et al 1986; Deller and Ellis 1992a; Ellis 1979, 1994a, 1994c; Jackson et al. 1995; Pavlish and Sheppard 1983; Roosa 1977a, 1977b; Roosa and Deller 1982), it has never been completely reported. The present study will serve to rectify that problem.

The Parkhill site is only one of a series of sites now known from the central to eastern Great Lakes area which have yielded a distinctive form of relatively small to medium sized, well-fluted, fish-tailed point. Roosa (1965) has named these Barnes points after the site in Michigan (see Voss 1977; Wright and Roosa 1966) where they were first reported. Parkhill was the first site to yield a large series of finished points of that type and in recognition of this fact, Roosa (1977b; Roosa and Deller 1982) has suggested the lithic industry of which these points are a diagnostic indicator be called the Parkhill Complex with Parkhill as the type-locality. Others have adopted that terminology although some prefer the term Parkhill *Phase* to Parkhill *Complex* (e.g. Deller and Ellis 1992a; Ellis and Deller 1997; Shott 1986, 1989, 1990, 1993). In addition to the

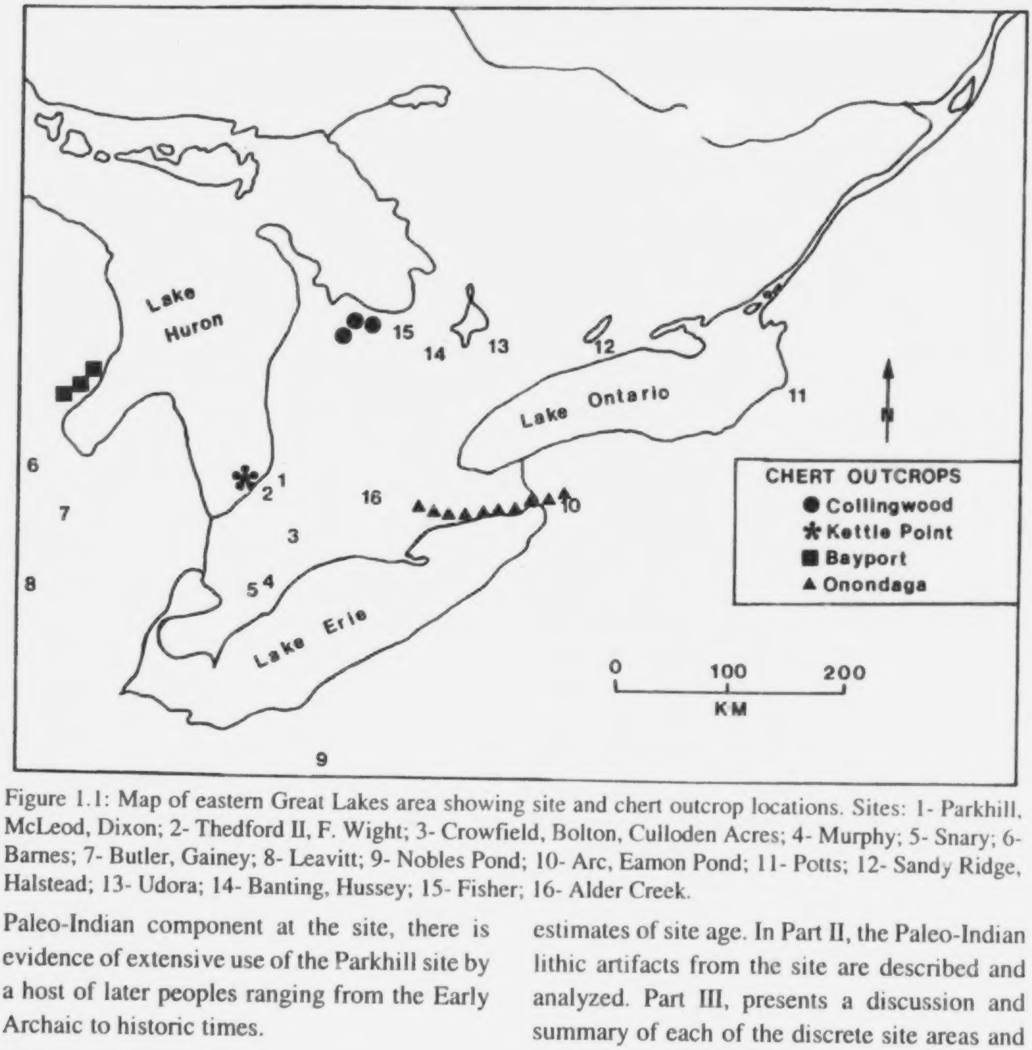

Figure 1.1: Map of eastern Great Lakes area showing site and chert outcrop locations. Sites: 1- Parkhill, McLeod, Dixon; 2- Thedford II, F. Wight; 3- Crowfield, Bolton, Culloden Acres; 4- Murphy; 5- Snary; 6- Barnes; 7- Butler, Gainey; 8- Leavitt; 9- Nobles Pond; 10- Arc, Eamon Pond; 11- Potts; 12- Sandy Ridge, Halstead; 13- Udora; 14- Banting, Hussey; 15- Fisher; 16- Alder Creek.

Paleo-Indian component at the site, there is evidence of extensive use of the Parkhill site by a host of later peoples ranging from the Early Archaic to historic times.

This report is organized into four sections. In Part I, the site is introduced through a discussion of: the circumstances of discovery; site setting and overall layout; excavation techniques employed; results of geological and paleoenvironmental studies carried out in conjunction with the site investigations; and estimates of site age. In Part II, the Paleo-Indian lithic artifacts from the site are described and analyzed. Part III, presents a discussion and summary of each of the discrete site areas and conclusions are drawn as to the nature of activities in, and association of, the various loci. In addition, the question of how Parkhill is similar or different from other large multi-locus sites is addressed. The final section, Part IV, synthesizes and outlines the major conclusions resulting from the study.

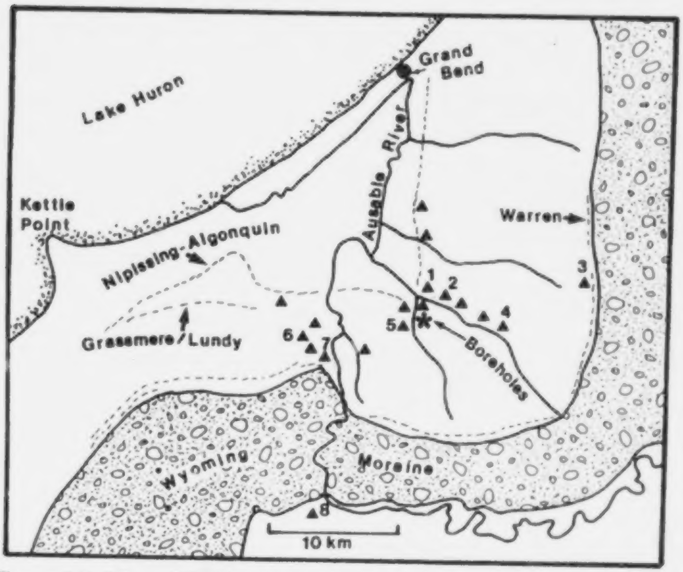

Figure 1.2: Map of Parkhill area showing site locations and important geological landmarks. Triangles: Early Paleo-Indian site. Dashed Lines: abandoned strandlines. Parkhill Phase Sites: 1- Parkhill; 2- Dixon; 3- Mawson; 4- Schoefield; 5- McLeod; 6- Thedford II; 7- F. Wight; 8-Stott Glen (Arkona).

Site Location and Setting

The site is located at an elevation of ca. 184 to 186 m (605 to 610') just northwest of the modern town of Parkhill and some 12 km (7.5 miles) southeast of the modern Lake Huron shore (Figures 1.1 and 1.2). Bordering the site on the west/southwest is an abandoned strandline. As will be discussed more below, this strandline is attributed to a post-glacial Nipissing Phase I lake (ca. 5500-4500 B.P.) but also appears to have been the general location of the strandline of either the main phase of pro-glacial Lake Algonquin or a "Post-Algonquin" Lake Ardtrea (ca. 11,000-10,400 B.P.). The specific assignment depends upon which model of lake levels one wants to follow (Jackson et al. 1995; Storck 1997).

The strandline runs in a rough north to south arc beside the site. About 0.4 km (1/4 mile) to the southwest it makes a major bend to the west. The strandline as a whole encompasses a roughly triangular shaped area west of the site which was an embayment (Thedford embayment) during the Nipissing phase. Prior to modern drainage changes, this lakebed was an extensive marsh with a small lake in the centre of its eastern half (Smith Lake).

Just to the south, the site is bordered by Parkhill Creek which, as it flows northwest into the embayment, cuts through the apex of the major strandline bend. This creek is joined on its southern side by a northward flowing creek immediately across from the site. In short, the site occurs north of and near a "T-shaped" drainage configuration as is the case on many known Paleo-Indian sites in southwestern Ontario (see Deller 1976a, 1979). The site itself, as well as adjacent areas to the north and east, is quite flat and one is impressed with the lack of any pronounced topographic relief in these areas (Figures 1.2 & 1.3). Crossing the site on an east/west axis are several long ridges. Two of these ridges cross the main area of Paleo-Indian occupation on the northern two-thirds of the site.

Today, these ridges are only about one to two feet high (see Figure 1.3) although prior to modern land clearing and cultivation they may have been slightly more pronounced. A major feature of the southern third of the site is an east-west oriented gully called Area F. This feature opens up on the Nipissing phase lakebed to the west. Although this gully has been filled and is now cultivated, at the time of the field investigations its eastern end was an uncultivated, low, marshy area and was the subject of paleoenvironmental and geological studies as will be described later.

Site Discovery and Layout

Deller began surveying for fluted point sites beginning in 1963 with some encouragement from the late Dr. W. V. V. Pardy of Mt. Brydges, Ontario. Upon meeting Roosa in 1966, he intensified these archaeological surveys in southwestern Ontario. Although the first surveys focussed on areas near Deller's residence west of London, Ontario, in an effort to publicize his work and to enlist volunteers to expand the effort, he gave a series of talks at local historical/archaeological societies. At a meeting of the former Archaeological Society of Western Ontario, he came into contact with three high school students from the Parkhill area: Gary Laye, Randy Laye and Ray Baxter. These individuals showed Deller some fluted points and other Paleo-Indian tools they had surface collected from a low cultivated depression in that area. In 1973, they graciously showed him the location of the finds.

Initial surface examination of the site resulted in the recognition that it consisted of several, major, discrete concentrations of Paleo-Indian lithic material distributed over approximately six hectares. In this regard, the site is much like several other extensive Paleo-Indian sites reported in the Great Lakes/Northeast (e.g. Gramly 1982; Grimes 1979; MacDonald 1968; Simons 1997; Simons et al. 1984; Storck 1983, 1997; Witthoft 1952). To date, at least nine concentrations have been recognized. These have been referred to as either "Grids" or "Areas" in the literature. The latter term will be employed herein. The Paleo-Indian "Areas" include A to E and G to K (Figures 1.2 and 1.3). Area F is not a Paleo-Indian concentration but instead, the location of test excavations designed to recover paleoenvironmental information. Area J was initially also seen as distinct but subsequent surface examination indicates it is simply an extension of Area A and as such, is treated as one single area (A/J) in this report. Details of the extent and nature of the Paleo-Indian occupations in each of these areas are given in Part III. Almost all known Paleo-Indian materials are found within these concentrations. There is very little peripheral scatter. For example, only four Paleo-Indian tools are known which were not in these concentrations. These include: a fluted point base recovered north of Area B; a fluted point tip from west of Area E; a side scraper from east of B; and a waterworn fluted point (see Ellis and Deller 1986) recovered from the Nipissing beach ca. 150 m (400 ft.) southwest of Areas A/J. This latter artifact, which is in a private collection, was not examined for the present study but it has been illustrated by Deller (1976b: Plate 5J). Roosa (1977a, 1977b) also reported on a possible fluted

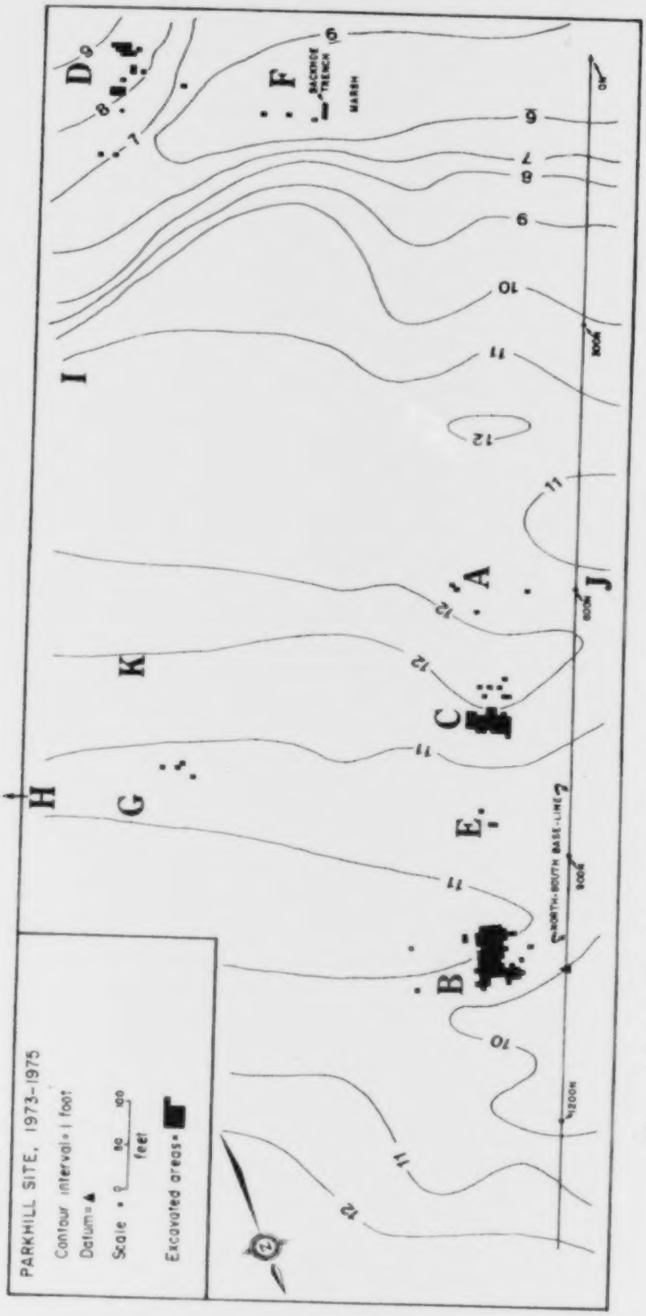
PARKHILL SITE, 1973-1975
Contour interval= 1 foot
Datum= ▲
Scale = 0 50 100
feet
Excavated areas=
A
B
C
D
E
F
G
H
I
J
K
BACKHOE TRENCH
MARSH
NORTH-SOUTH BASE-LINE
1200N
900N
800N
300N
0N
6
7
8
9
10
11
12
N

Figure 1.3: Topographic map of the Parkhill site. Datum assigned arbitrary elevation of 10 feet.

"drill" from the site. This item, also was recovered isolated from the main areas of Paleo-Indian finds, having been found northeast of Area D. However, as we will discuss in later sections, there is doubt as to the Paleo-Indian affiliation of this artifact. Other Paleo-Indian concentrations seem to exist closer to Parkhill Creek some 250+ metres southeast of Area D as well as south/southwest of Area D. These are distant enough that Deller has always considered them as separate sites. Excepting the Dixon site (Deller and Ellis 1992a), they have not been examined in any detail.

Besides the Paleo-Indian materials, there is evidence of extensive occupation on the site by later peoples ranging from Early Archaic to Late Woodland in affiliation (see Deller 1980a; Deller et al. 1986; Ellis 1994c; Ellis and Deller 1986; Fisher 1987a, 1987b). However, with the major exception of Area D and some ephemeral traces on other areas, these later occupations occur largely in areas which are not co-extensive with the locations of Paleo-Indian site use. Hence, except for some minor amounts of the later materials encountered in excavated units, they are not considered in detail this report. It is worth noting as well, that the vast majority of the Paleo-Indian artifacts are on a lithic material (Fossil Hill chert Collingwood variant; see Part II below) not employed in later site occupations and thus, they are easily identified. Moreover, even the few Paleo-Indian tools on materials also used by later site occupants (largely Onondaga chert) are usually readily identified because of their different morphology/technology and because they are quite weathered.

At the time of the site discovery, Roosa and Deller were involved in excavations at some other sites in the London area. The crews involved in these excavations were switched to Parkhill and digging began in July 1973. At the same time, Deller began an intensive survey for other Paleo-Indian sites in the area. Besides several Late Paleo-Indian sites (see Deller 1976b, Ellis and Deller 1986), these surveys have located 17 other fluted point sites in the vicinity (Deller 1976a, 1976b; Deller et al. 1986). In all, parts of three field seasons were spent in excavations at the site between 1973 and 1975. A total of 24 weeks were spent at the site and over 4000 square feet were excavated by a crew ranging in size from mainly four to eight individuals. As should become clear in the following, this total represents only a small fraction of the site occupation area as it is currently known through surface collection. Only three of the major concentrations saw relatively extensive excavation (over 600 square feet; Table 1.1) while another three saw limited test-pitting. As well as the Parkhill excavations, test excavations were concurrently conducted at another site in the vicinity (McLeod, see Figure 1.2; Deller and Ellis 1992a; Muller 1999).

Excavation Techniques

The site was excavated in relation to a grid of five foot squares. At the time of the excavations, most of the Paleo-Indian site areas were in a single field which was bordered on the west by an uncultivated farm lane. As of 1973, records indicate that this field had been cleared and cultivated or used as pasture for just over 100 years. A main north-south base-line was established along the western edge of the field bordering the east side of a farm lane (Figure 1.3). This line was oriented at 20° east of true north and parallelled the direction the site was plowed. It was arbitrarily designated 0 East. East-west base-lines tied into this main base-line were established in each area excavated or tested and a grid of squares was established by triangulation from the east-west base-line employed in each area. Excepting Area B, these east-west lines were located exactly at right-angles to the main north/south base-line (i.e. at 110° east of true north). In Area B, the east-west line was established at a slight angle towards the northeast of those established for other areas (Figure 1.3). The east-west line in the first area to be tested (Area A) was arbitrarily designated 600 North and the base-lines established for all other site areas were numbered according to this designation. For example, the east-west line for Area E was 265' north of that for Area A along the north-south line and so, was designated 865N (Figure 1.3).

The five foot squares in each area were designated by the intersection co-ordinates of

Table 1.1: Estimated Area Size and Amount Excavated, Parkhill Site.[1]

Area	Area Size (m^2)	Area Size (sq. ft.)	Area Excavated (sq. ft.)
A/J	300	3250	100
B	400	4300	2175
C	250	2700	1200
D	2000	22000	625
E	300	3250	75
G	300	3250[3]	100[2]
H	950+	10,000+	-
I	800	8500	-
K	300	3250[3]	-

[1]: totals in m^2 have been rounded off to nearest 50 m^2; [2] : The units excavated at Area G were sterile and apparently placed erroneously outside and southwest of the main concentration; [3] : A communication error between the authors led to the size of these areas being over-emphasized in Deller and Ellis (1992: Table 23). The estimates reported here supercede those earlier estimates.

the southwest corner. Since they were almost all in areas North and East of the arbitary intersection point of the ON and OE line, we refer to squares in this report without the northing and eastern suffix (e.g. as 965/65 rather than as 965N/65E). The only exceptions are a few squares in Area D where it turned out they were slightly south of the 0 North line. When these squares are mentioned they always have a suffix "S" as in 5S/460. Since all site areas with the exception of Area F were in cultivated areas, the plowzone was removed with shovels and screened. With some exceptions to be noted for particular areas in the Section III discussions later, 1/8" mesh was used to screen the top 0.2 ft. in the plowzone to obtain a sample of the smaller materials. One-quarter inch mesh was used at all other depths. Most flaking debris was simply bagged by five foot unit and not individually catalogued. However, only one shovel-load of earth was screened at a time and horizontal co-ordinates were taken to the centre of the area of the removed earth for each tool, tool fragment and channel flake recognized as such at the time of excavation. Each of these was individually catalogued. As the excavation and concomitant analyses progressed, it was recognized that certain other forms of debris, notably uniface retouch flakes, might be useful as indicators of certain spatial activities and also, through refitting, give clues as to ploughing disturbance, activity areas, etc. at the site. As a result, piece plotting of individual flakes of that type was carried out during much of the 1975 season and as well, all of these flakes, including even those recovered in 1973 and 1974 were labelled with catalogue numbers to assist in the refitting efforts.

The plowzone-subsoil interface was cleaned and examined for features by trowelling. If features occurred, they were drawn and photographed and bulk samples of feature matrix were taken. As well, specialists collected samples for palynological analyses from some feature areas. Excepting parts of Features 9, 23 and 28/31 at Areas B and D, which were hand processed in the lab, flotation samples were processed with a S.M.A.P. machine. The light fraction was recovered in 0.59 and 6.3 mm sieves. The heavy fraction was collected in 2.0 mm mesh. The subsoil was excavated with shovels and by screening (usually 1/4" mesh) if no cultural materials were encountered. Otherwise, more refined recovery techniques were employed. With the exception of Area D and of course, cultural features, very little subsoil cultural material was encountered. Horizontal and vertical co-ordinates were taken on *in situ* material. The subsoil was taken down in each square until it was evident that the area was sterile. Exceptions were some deep tests designed to expose and collect information on the age, and nature of the site soils and matrix.

Although we both participated in the excavations, this report has been largely written by individuals who were not present during much of the ongoing day to day excavations at the site. Often, attempting to report on excavations by others can be a frustrating experience. Yet, it is a tribute to the late William B. Roosa, who was trained in meticulous stratigraphic excavations in the Southwest, as well as to the field crews, that we experienced few problems in carrying out the analysis of the site through the available records. Copious field notes were available for every fieldworker as well as detailed drawings and an extensive photo record. In fact, they were so detailed that the artifact record forms even included sketches and measurements of each individual artifact taken in the field. This sort of information proved invaluable in checking the accuracy of the artifact catalogue and in locating materials for analysis. Moreover, even where the notes may have lacked certain information, as on the nature of features encountered at the site, the extensive photo record as well as the numerous soil and feature samples taken from the site, allowed us to determine in the lab whether the recognized features were cultural or not and if cultural, what kinds of post-depositional factors may have disturbed these features.

CHAPTER 2

GEOLOGICAL HISTORY AND PALEOENVIRONMENT

by Alan V. Morgan, John H. McAndrews and Christopher Ellis

Introduction

In this chapter, we place the Parkhill site into a geological and paleoenvironmental context. In addition to drawing upon the general literature on these topics for the central to eastern Great Lakes, information collected from the site and environs in conjunction with the archaeological studies is synthesized. These paleoenvironmental studies were undertaken by Alan V. Morgan (Pleistocene geology and fossil insects), J. H. McAndrews (palynology) and Andrew J. Cooper (Pleistocene geology and soils). Although much information recovered from the site pertains to time periods post-dating that inferred for the Paleo-Indian occupation, these latter events provide information on disturbance processes active at the site since Paleo-Indian times. Knowledge of these processes is essential to an interpretation of the evidence and is summarized below. Moreover, this information is important because it has been (e.g. Ellis and Deller 1986) or will be useful in providing a context for other studies of later prehistoric occupations in the area.

First, we present an overview of the geological and vegetation history of the southeastern Huron basin and adjacent areas. This overview will provide a framework into which specific project data can be placed and interpreted. Second, the project data itself is summarized and placed into the framework provided by the general overview. Finally, estimates of the age of the Paleo-Indian occupation of the site are presented and the setting of the site at that time is delineated.

General Overview

Geological History

The southern Huron basin region underwent a complex series of geological events during Late Pleistocene and post-Pleistocene times. By about 17,000 B.P. the Late Wisconsin ice sheet had begun to retreat from the Great Lakes area (Dreimanis 1977; Fullerton 1980; Karrow and Warner 1988). This retreat was accompanied by a series of pro-glacial lakes formed at the ice-sheet margins. The retreating ice first exposed the Parkhill area at ca. 13,500 B.P. during the Mackinaw Interstade. However, the region probably remained inundated by pro-glacial Lake Arkona during at least some of this period (see Eschman and Karrow 1985:83). The area was subsequently covered again by the Huron ice lobe during the Port Huron stadial readvance of ca. 13,000 B.P. (Figure 2.1). This readvance blanketed the area with the St. Joseph till (Cooper 1979:19) and obliterated most of the surface evidence of previous geological events. The most visible product of the Port Huron readvance is the Wyoming Terminal Moraine. This feature follows the orientation of the modern Lake Huron shore and occurs about 8 km to the south and east of the Parkhill site (Figure 1.2). The moraine is 4 to 8 km wide and rises to an elevation of over 800' (244 m) a.s.l. or ca. 125-200' (38-61 m) above the

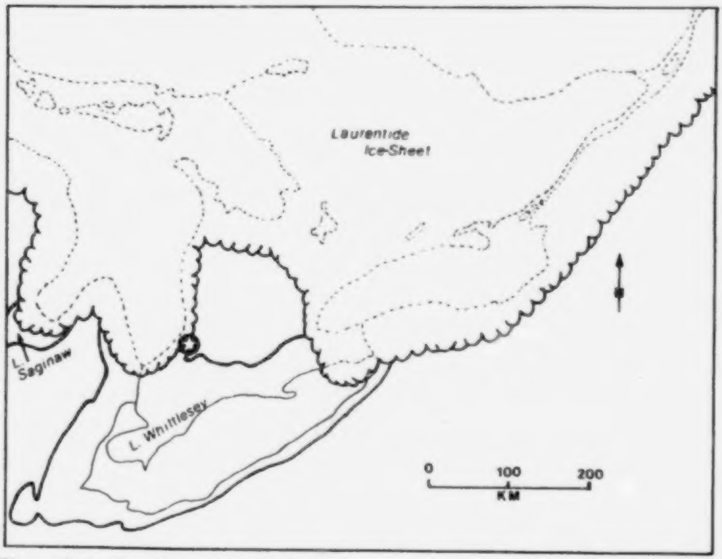
Laurentide Ice-Sheet
L. Saginaw
L. Whittlesey
0
100
200
KM

Figure 2.1: Southern Ontario at time of Port Huron Stade, ca. 13,000 B.P. Star shows Parkhill site location.

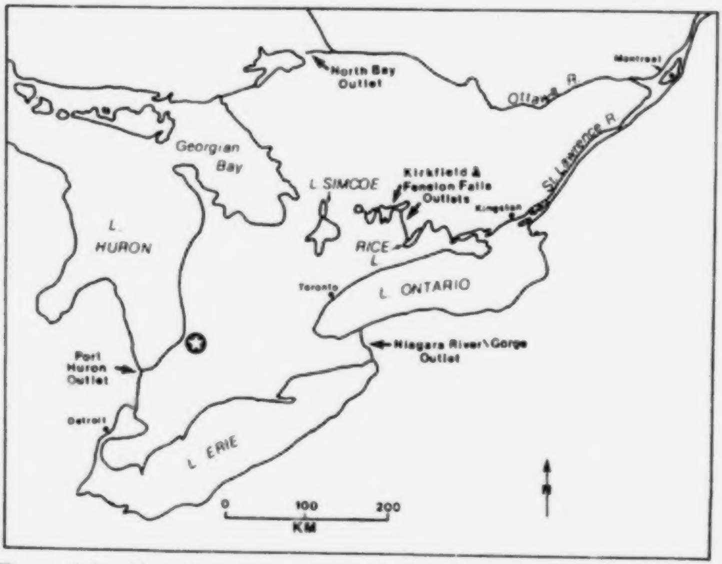
North Bay Outlet
Montreal
Ottawa R.
St. Lawrence R.
Georgian Bay
L. SIMCOE
Kirkfield & Fenelon Falls Outlets
Kingston
RICE L
L. HURON
Toronto
L. ONTARIO
Niagara River\Gorge Outlet
Port Huron Outlet
Detroit
L. ERIE
0
100
200
KM

Figure 2.2: Map of modern eastern Great Lakes showing location of various drainage outlets.

surrounding terrain. After the Port Huron advance, the ice began its final retreat from the area. The Warren series of pro-glacial lakes formed between the ice-sheet and the Wyoming Moraine by ca. 12,500 B.P. and mantled the area with lacustrine deposits. The relatively well-developed Warren strandlines straddle the northwest margin of the Wyoming Moraine (Figure 1.2) at elevations between ca. 710 and 730' (216-222 m; Cooper 1979:29). Continued retreat of the ice-sheet resulted in falling water levels. At least two pro-glacial lakes, Grassmere and Lundy, formed and drained by about 12,400 B.P. These were very short-lived and consequently left little trace in the area. A poorly developed strandline which may relate to either of these lakes is traceable at an elevation of ca. 640' (195 m) to a point 14 km (8.7 miles) west of the Parkhill site (Figure 1.2) but there is no definitive evidence of these lakes near the site (Cooper 1979). All lake levels after Grassmere/Lundy are below the elevation of the

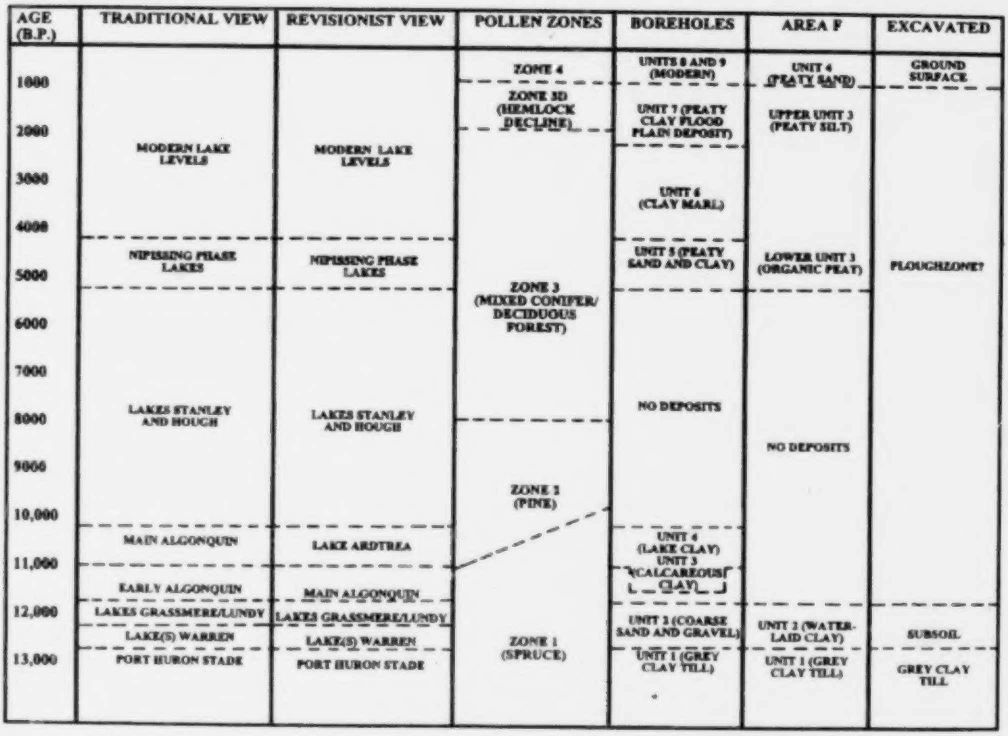
AGE (B.P.)
TRADITIONAL VIEW
REVISIONIST VIEW
POLLEN ZONES
BOREHOLES
AREA F
EXCAVATED
1000
2000
3000
4000
5000
6000
7000
8000
9000
10,000
11,000
12,000
13,000
MODERN LAKE LEVELS
NIPISSING PHASE LAKES
LAKES STANLEY AND HOUGH
MAIN ALGONQUIN
EARLY ALGONQUIN
LAKES GRASSMERE/LUNDY
LAKE(S) WARREN
PORT HURON STADE
MODERN LAKE LEVELS
NIPISSING PHASE LAKES
LAKES STANLEY AND HOUGH
LAKE ARDTREA
MAIN ALGONQUIN
LAKES GRASSMERE/LUNDY
LAKE(S) WARREN
PORT HURON STADE
ZONE 4
ZONE 3D (HEMLOCK DECLINE)
ZONE 3 (MIXED CONIFER/ DECIDUOUS FOREST)
ZONE 2 (PINE)
ZONE 1 (SPRUCE)
UNITS 8 AND 9 (MODERN)
UNIT 7 (PEATY CLAY FLOOD PLAIN DEPOSIT)
UNIT 6 (CLAY MARL)
UNIT 5 (PEATY SAND AND CLAY)
NO DEPOSITS
UNIT 4 (LAKE CLAY)
UNIT 3 (CALCAREOUS CLAY)
UNIT 2 (COARSE SAND AND GRAVEL)
UNIT 1 (GREY CLAY TILL)
UNIT 4 (PEATY SAND)
UPPER UNIT 3 (PEATY SILT)
LOWER UNIT 3 (ORGANIC PEAT)
NO DEPOSITS
UNIT 2 (WATER-LAID CLAY)
UNIT 1 (GREY CLAY TILL)
GROUND SURFACE
PLOUGHZONE?
SUBSOIL
GREY CLAY TILL

Figure 2.3: Glacial history sequences comparing traditional and revisionist models of Main Lake Algonquin for southern Huron basin area and correlations with Parkhill site data. For ease of presentation, some events have been omitted such as low water stages and post-Algonquin lakes.

Parkhill site. Thus, the first opportunities for human occupation post-date ca. 12,400 B.P. However, as will be discussed later, penetration of the area by human groups probably did not take place until ca. 11,000 B.P.

The first of the lakes below the elevation of the Parkhill site, and the last of the pro-glacial series to some investigators, was Lake Algonquin. This lake, or actually a series of lakes, formed when the ice margin had retreated to a position about 100 km north of the Parkhill site. Algonquin is usually said to have had two stages but the evidence for a first phase or Early Lake Algonquin is not clear (Eschman and Karrow 1985:87-88). Those favouring its existence infer it was short-lived around 12,000 B.P. after which water levels fell much below that of modern Lake Huron. This low water Kirkfield phase was due to the removal of ice from an outlet to the east at Fenelon Falls which allowed Early Algonquin to drain southeast into pro-glacial Lake Iroquois in the Ontario basin. The Kirkfield phase ended with the closure of the Fenelon Falls outlet (Figure 2.2) due to either a minor ice readvance or isostatic rebound. Water levels subsequently rose to form the Main Algonquin stage (Figures 2.3 and 2.4).

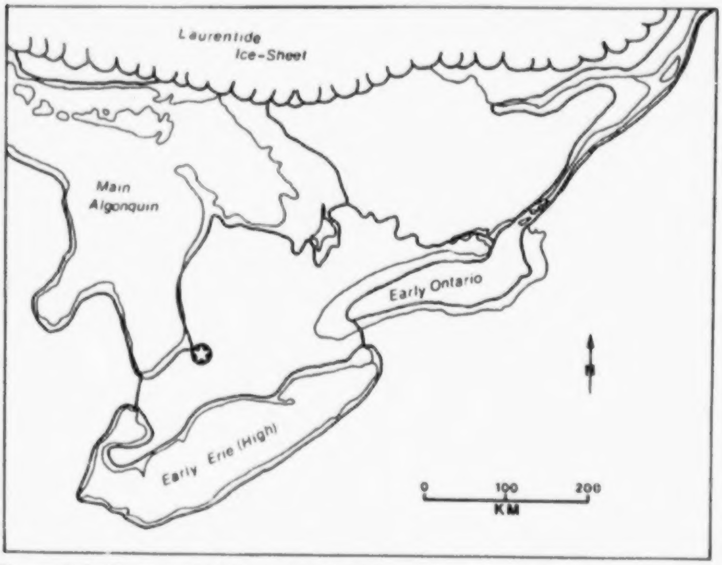

Figure 2.4: Extent of Main Lake Algonquin in traditional view, ca. 11,000 to 10,500 B.P.

As has been discussed in more detail elsewhere (e.g. Jackson et al. 1995; Storck 1997:248-250), there are at least two conflicting interpretations of the age of this lake stage (Karrow 1986; Karrow et al. 1975; Kaszicki 1985; Larsen 1987).

One model, which we call the "traditional" model (Jackson et al. 1995) is best expressed in Karrow et al. (1975). They propose that Main Algonquin lasted from ca. 11,200 to 10,400 B.P. (Figure 2.3). Their model has profoundly influenced past interpretations of the age and setting of Paleo-Indian sites because this time interval corresponds to the probable time of the Early Paleo-Indian occupation of Ontario (e.g. Deller 1980b; Deller and Ellis 1992a, 1992b; Roosa 1977a, 1977b; Storck 1982, 1984a, 1984b). It is argued Main Algonquin was at such an elevation that it drained for at least part of its existence through the Port Huron outlet south into the Lake Erie basin (see Figure 2.2) and that it reached an elevation of 605' (184 m) in the southern Huron basin area where the Parkhill site is located (Figure 2.4). However, with continuing ice retreat to the north, a series of outlets were uncovered at progressively lower elevations. Beginning ca. 10,400 B.P. lake levels dropped stepwise through a series of lakes (called the "Post-Algonquin group") as outlet flow switched from Port Huron to the outlets near North Bay, Ontario, and hence, down the modern Ottawa River valley. These Post-Algonquin lakes are named and include Lake Ardtrea, Lake Orillia and several others.

From 10,000 to around 5500 B.P., lakes in the Huron and Georgian Bay basins (Lakes Stanley and Hough; see Eschman and Karrow 1985; Hough 1963) were much below the modern level of Lake Huron (Figure 2.5). However, by 5500 B.P. a major rise in water levels in the Huron basin called the Nipissing Phase occurred. Isostatic rebound closed the North Bay outlet and water levels rose to a level of 605' (184 m; Figure 2.6). As noted above, Karrow (1980) infers this to have been the same level occupied by the much earlier Main Lake Algonquin. Nipissing waters began to drain south through outlets such as at Port Huron. Nipissing strandlines are well-developed in the Thedford embayment area and are locally

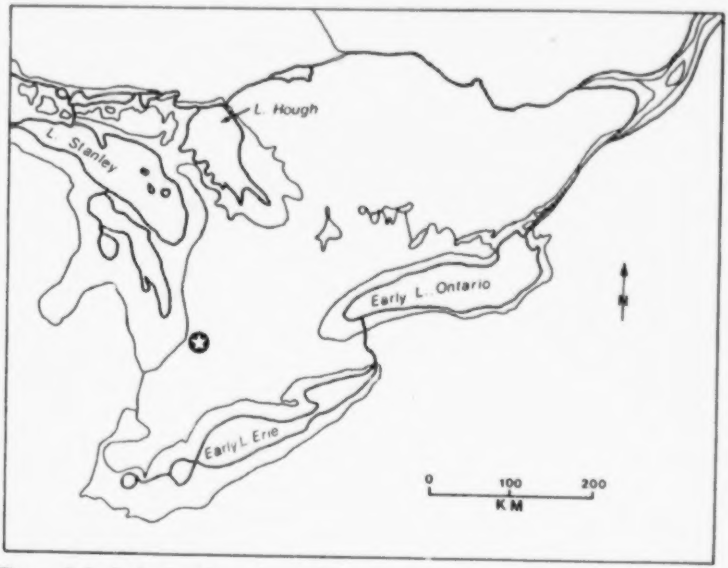

Figure 2.5: Lake levels at time of Stanley/Hough Low Stage, ca. 10,000 to 5500 B.P.

backed by an up to 10 metre (33') high shorecliff. The lake had several major inlets at the point where major modern streams entered the embayment such as at the Ausable River and Parkhill Creek. Eventually, downcutting at the Port Huron outlet led to the lowering of water from the maximum Nipissing elevation after ca. 4500 to 4000 B. P. (Larsen 1984) until levels finally reached those of modern Lake Huron (ca. 580'; 177 m).

Although this model proposes Main Algonquin reached the 605' level near the Parkhill site, the exact local placement of the strandline is not clear. To the north of Parkhill, what this model regards as a Main Algonquin strandline can be traced. This feature is separate from, and at a higher elevation than, the later Nipissing Phase feature due to differences in their age and thus, differential exposure to the effects of isostatic rebound. In the southernmost part of the Huron basin, the Algonquin strandline cannot be easily located. It is argued that this strandline was shared here with the Nipissing Phase because there was no isostatic rebound. Rather, isostatic activity had affected only that area north of the "hinge-line" located near the modern town of Grand Bend (Figure 1.2). Therefore, the strandline is sometimes referred to as "Nipissing-Algonquin" (e.g. Cooper 1979). Yet, Karrow (1980) summarized available data from the southern Huron basin and concluded that the directly dated Nipissing-Algonquin strandline in that region consisted solely of Nipissing age sediments. He stated that Main Algonquin had achieved the same elevation as Nipissing in the area at ca. 605' (184 m) but that the later Nipissing transgression had extensively reworked the Algonquin beach sediments.

In contrast to the traditional model of Main Algonquin sketched in above there is a "Revisionist" (Jackson et al. 1995) model of the age and extent of that lake and which is best expressed by Kaszycki (1985) and Larsen (1987). The reasons for these conflicting interpretations are beyond the scope of this study except to note that it is based on work which predicts different elevations in more southern areas for Main Algonquin based on southward projections from known elevations of that lake in more northern areas of the province.

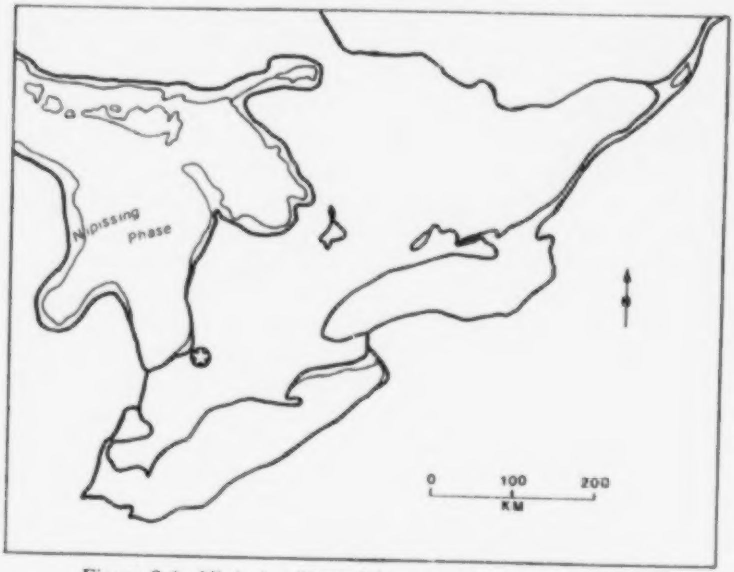

Figure 2.6: Nipissing Phase lakes, ca. 5500 to 4500 B.P.

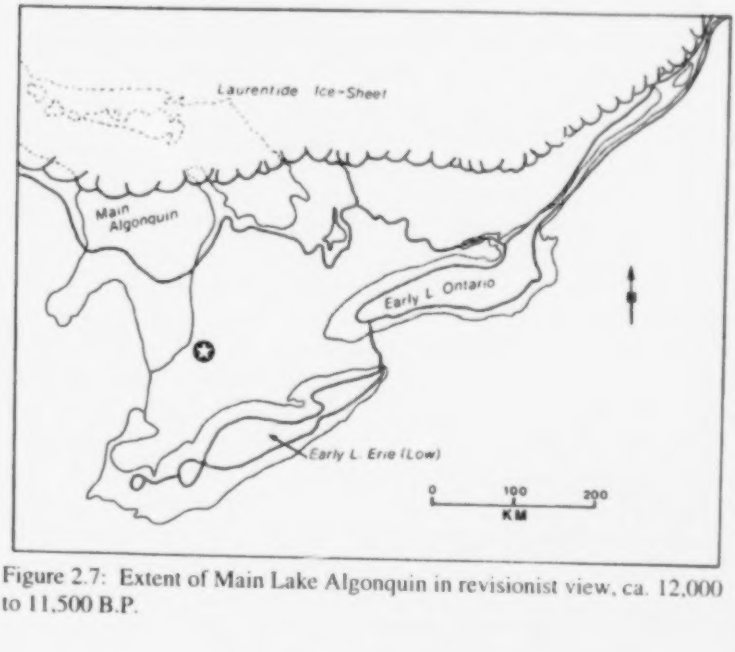

Figure 2.7: Extent of Main Lake Algonquin in revisionist view, ca. 12,000 to 11,500 B.P.

Suffice to say, this model proposes that Main Algonquin drained through the Kirkfield outlet (Figure 2.7) throughout its history and never reached an elevation for drainage at Port Huron into Lake Erie. The projection also indicates that the actual southern margin of Main Algonquin did not reach the Parkhill site vicinity but instead, was located about 100 km to the north (Figure 2.7). Finally, the revisionist model argues the lake ended much earlier than in the traditional model; that is, that Main Algonquin had ended by around 11,500 B.P. (Figure 2.3) or dates to a time older than any of the large number of radiocarbon determinations now available for fluted point producing peoples throughout North America (see for example, Curran 1996; Ellis et al. 1998; Fiedel 1999; Haynes 1992; Levine 1990).

Taken at face value, this revisionist model undermines the long-standing idea of an association between Main Algonquin or any southern Huron basin lake level for that matter, and the Early Paleo-Indian occupation of the province. However, it is worth noting that this newer model also suggests some subsequent developments which may be germane to understanding the Parkhill site geological setting. In particular, workers such as Kaszycki (1985) have also provided projections of the elevations of the subsequent Post-Algonquin lakes in the southern Huron basin. These projections suggest that due to the continuing effects of isostatic rebound, during the period of ca. 11,000 to 10,400 B.P. the levels of at least some of these Post-Algonquin lakes were above the elevations projected in this model for the earlier Main Algonquin. In particular, they suggest that the earliest Post-Algonquin lake called Ardtrea was above Algonquin and imply that dates used by Karrow et al. (1975) to mark the end of Main Algonquin actually date Ardtrea. They also imply Ardtrea may have reached elevations at least as high or higher than the levels of modern lake Huron in the southern Huron basin where the Parkhill site is located. In other words, there is a distinct possibility that there were water levels in the southern Huron basin above those of the modern levels of that lake which were contemporary with the Early Paleo-Indian occupations. However, this lake was not Main Algonquin as previously thought, but instead was Lake Ardtrea. Further, there is a possibility that the lake shoreline with which Early Paleo-Indian sites in more northern parts of southcentral Ontario are definitely associated in the ca. 11,000 to 10,500 B.P. period is also Ardtrea (Storck 1997:248-250).

Regardless of whether the higher water levels in the Huron basin related to the Paleo-Indian occupation was Main Algonquin or Ardtrea, it is important to note that there is evidence of higher water levels in the southern Huron basin during the period from ca. 11,000 to 10,500 B.P. One good source of evidence is the wealth of data now appearing for the Lake Erie basin to the south (e.g. Pengelly 1990; Pengelly et al. 1997; Tinkler 1993; Tinkler et al. 1992, 1994). These data strongly indicate that water had to be flowing into Erie from the Upper Great Lakes. In short, water levels were high enough in the southern Huron basin such that water was draining through the Port Huron outlet (Figure 2.2) into the Lake Erie basin. Another major source of evidence is the geological data recovered by the Parkhill project from the southern Huron basin area as will be discussed below.

In summary, based upon our reading, the major events which could possibly have affected the site area or are important from the perspective of the Paleo-Indian occupation of the site are (Figure 2.3): the Port Huron ice advance (13,500 B.P.), flooding of the area by Lake(s) Warren (12,500 B.P.); the Main stage of Lake Algonquin or Post-Algonquin Lake Ardtrea (11,000 to 10,400 B.P.); the subsequent drop in water levels to the Stanley low stage (10,000 to 5500 B.P.) and finally, the Nipissing transgression (5500 to 4000 B.P.). Lakes Grassmere, Lundy and Early Algonquin, as well as events prior to the Port Huron advance and perhaps even Main Algonquin, either had little effect on the area, have been obliterated by subsequent events or are unimportant to the Paleo-Indian occupation of the site.

Vegetation History

As in the rest of the Northeast, inferences on the past environment of southern Ontario have been based primarily on the nature and composition of sediments, analyses of invertebrate assemblages such as molluscs and insects and especially, pollen analysis. The dated pollen record at several sites provides an excellent means of cross-dating deposits and at the same time, yields a convenient framework with which to organize other paleoenvironmental information.

Several time-sequential pollen zones can be recognized. McAndrews (1981, 1994) scheme of four major zones is followed here. Some subzones can be delineated. Generally, these will be noted only where they are relevant to the specific data collected from Parkhill. Prior to ca. 13,000 B.P., some of the deglaciated parts of the landscape supported a short-lived, treeless (or nearly so), tundra (subzone 1a) dominated by the pollen of sedges (Cyperaceae) (McAndrews and Jackson 1988; Mott and Farley-Gill 1978). The presence of polygonal ground features (Morgan 1972) and fossil insect assemblages (Edwards et al. 1985:1724; Morgan et al. 1983:358) indicate a periglacial environment at that time with mean annual temperatures below freezing. This landscape was invaded by trees due to climatic warming (subzone 1b). The main diagnostic indicator of subzone 1b is abundant spruce (*Picea*) pollen. High percentages of spruce pollen (over 30%) and C-14 dated macro-fossils (Terasmae and Matthews 1980) show these trees were present by 13,000 B.P. in at least the most southerly areas of Ontario (Karrow and Warner 1988:46).

Initially, this was an open landscape spruce woodland similar to the boreal forest/tundra transition of the modern sub-arctic. The open nature of the landscape is indicated by a high percentage of herb and shrub pollen such as Cyperaceae, Gramineae and *Artemisia*, mineral-rich sediments (McAndrews 1981:323), and a low rate of pollen influx per unit time (Mott and Farley-Gill 1978; cf. Davis 1969:411). Comparison with modern spruce woodlands should not be taken to indicate complete similarity. For example, thermophilous deciduous tree pollen such as that of oak (*Quercus*) is consistently recovered. This pollen does not occur in the pollen rain of modern forest/tundra transition areas but can consist of up to 10% of the Zone 1 pollen assemblage (see Mott and Farley-Gill 1978; Watts 1983:308). Some interpret this to indicate that these trees were present as a minor component in well-drained upland localities (Karrow et al. 1975:57) while McAndrews (e.g. 1981:329) and Morgan suggest the grains were simply blown in from the south.

Although the spruce pollen zone indicates initially a widespread open landscape, through time there are decreases in shrub pollen and increases in the pollen influx which indicate a more closed vegetation cover developed at certain sites. An example is the Gage Street site in Kitchener where as early as 12,000 to 12,500 B.P., a more dense spruce cover is present (Schwert et al. 1985) although this was not a closed boreal forest. In any case, a more open spruce woodland seems to have persisted in many areas for some time. In fact, Muller (1999) recently has considered the spread of various kinds of vegetation into and across southern Ontario by compiling and interpolating data from dated pollen profiles reported at 100+ sites in the area. Using critical percentages of pollen of various species as indicators of certain kinds of tree cover (following Gaudreau 1988), he has mapped the spread of these various covers. Of note here is the mapping of the 5% Non-Arboreal (herb) Pollen (NAP) as an indicator of an open environment, as well as the mapping of spruce pollen. He found that by around 11,000 years ago, all of southern Ontario was covered by an open spruce woodland (sometimes called "parkland") environment. By 10,500 B.P., declines in the NAP indicate this woodland had been replaced by a closed spruce forest throughout southwestern-most Ontario from around the Parkhill area southward. However, an open spruce woodland persisted in areas to the northeast (e.g. southcentral Ontario including the location of well-known fluted point sites such as Udora [Storck and Spiess 1994] and Fisher [Storck 1997]) until 10,000 B.P. or later.

Pollen Zone 2 is marked by a decrease in spruce pollen and a peak in pine (*Pinus*). Spruce probably persisted in lower, more poorly drained areas. The change from Zone 1 to Zone 2 is abrupt on standard pollen diagrams. This transition is generally stated to have occurred around 10,600 to 10,500 B.P. This estimate is based on an average of six C-14 dated pollen profiles from northern Ohio, eastern Michigan and southern Ontario reported some time ago by Karrow et al. (1975:53) although, as we will return to later, this dating can be questioned on several grounds (Jackson et al. 1995).

Analogies are often drawn between Zone 2 pollen assemblages and southern areas of modern boreal forests. However, the high percentage of trees such as oak and other hardwoods inferred from pollen diagrams (Mott and Farley-Gill 1978:1109) suggest deviations from the modern boreal situation. Although Muller (1999) tracked individual species rather than several as is used in the zonal approach, his mapping is a useful adjunct and the mapping of the arrival of 20% pine as a significant percentage indicates a pine-rich forest had extended into the southwestern-most area of the province by 10,500 B.P. and then spread northeast into the Parkhill area and beyond after that date.

Zone 3 represents a mixed evergreen/deciduous forest of a more modern aspect. Pine pollen decreases and elm (*Ulmus*), maple (*Acer*), beech (*Fagus*), hemlock (*Tsuga*), hickory (*Carya*) and ash (*Fraxinus*), among others, increase. The transition from Zone 2 to this Zone 3 assemblage dates to around 8,000 B.P. (McAndrews 1981, 1994). Zone 3 continued until about 130 years ago. The pollen assemblages varied throughout zone 3 and four subzones can be recognized. The latest (3d) is notable for our purposes. It consists of a decline in hemlock and beech pollen and increases in pine, maple and oak around roughly 1000 B.P. (McAndrews 1994).

The final pollen zone (4) represents simply the extensive land clearance by Europeans and is marked by increases in ragweed (*Ambrosia*) and grasses reflecting more open weedy vegetation.

Project Data

Geological and paleoenvironmental data were collected from three main locations in the Parkhill site vicinity. First, such data were collected from Area F (Brophey Ditch), the small, linear marshy area adjacent to Paleo-Indian activity area D (Figure 1.3). Second, bore holes were made on a tributary of Parkhill Creek south of the site by A. V. Morgan to produce continuous core samples (Figure 1.2). Finally, data were collected from excavated Paleo-Indian concentrations, particularly Areas B, C and D (Figure 1.3). These separate localities and the information provided by each are discussed below. Correlations are drawn between the localities and with the general geological and vegetation history framework outlined previously.

Area F

This area was investigated in 1975. Because it was not cultivated and was surrounded by evidence of Paleo-Indian activity, it was hoped that undisturbed cultural deposits would be encountered. Moreover, the low marshy nature of the area (ca. 605-610'; 184-185m) raised the possibility that preservation of organics would provide material to allow dating of the site and to directly infer the nature of the environmental setting and Paleo-Indian subsistence practices.

The initial investigation consisted of the hand excavation of three five foot squares to varying depths. The maximum depth was achieved in the easternmost of these squares (75/270) which was taken down to ca. 4 ft. (120 cm). At 2.5 ft. (75 cm), the water table was encountered. Excavation below that level was difficult because water had to be continually pumped out. Moreover, the small size of the area made it difficult to maneuver and observe the deposits and there was a constant danger of slumping of the square walls. These difficulties, as well as the fact that even the deepest exposed deposits much post-dated the Paleo-Indian occupation necessitated a change in strategy. In order to gain a better understanding of the deposits, it was necessary to expose a wider and deeper area. A backhoe was used to expose a 19.5 ft. long by 5 ft. wide trench down to a depth of ca. 10 ft. This cut was placed just to the west of the deepest five foot square (Figure 1.3). It was reasoned that this trench would provide a quick evaluation of the potential of the area for containing Paleo-Indian deposits and if located, their stratigraphic position could be readily determined and more careful excavation could be carried out to expose those deposits.

Continuous slumping of the lower parts of the trench meant that only the upper 6 ft. could be examined in detail. However, this was sufficient to indicate that no deposits of roughly Paleo-Indian age were present. The backhoe cut showed that the deposits represent a semi-circular depression cut down into and surrounded by older deposits (Figure 2.8). This depression represented an old stream channel. In the depression itself were two main stratigraphic units. These units had been exposed to varying degrees in the five foot test squares. The uppermost unit (Unit 4) consisted of a peaty sand which extended from the surface down to depths ranging from 40 to 60 cm. In general, this unit and others to be described below thinned eastwards. This upper unit was formed in historic times by soil eroded from the surrounding cultivated fields. The dating of this unit to the historic period is confirmed by its Zone 4 pollen assemblage (Figure 2.9) as well as the fact that it contained historic artifacts ranging from a clay inkwell to fence wire.

Below the peaty sand was a peaty silt containing gastropods and tree trunk sections. This unit (Unit 3) averaged about 90 cm thick and extended down to 130 to 150 cm below the ground surface. The pollen assemblage, although somewhat poorly preserved, is Zone 3 (Figure 2.9). The uppermost 20 cm or so is Subzone 3d and should span 1,000 to 150 B.P. The lower sediments of this peat are assigned to earlier Zone 3 pollen subzones. Two C-14 dates were obtained on this part of the unit. A hemlock log in the westernmost five foot square was dated at 4570+/-95 B.P. (I-9355) and a twig sample from the bottom of the unit in the backhoe trench was dated at 5080+/-250 B.P. (WAT-245). Thus, the earliest part and bulk of the Unit 3 deposit clearly correlates with the Nipissing transgression of ca. 5500 to 4500 B.P.

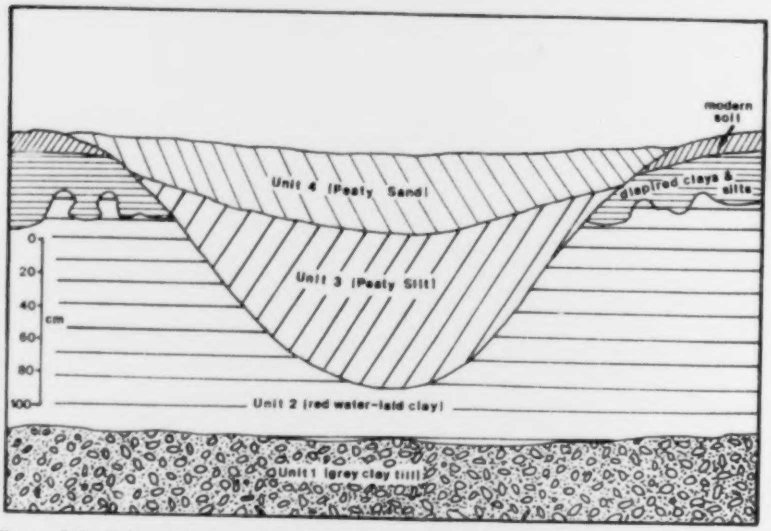

Figure 2.8: Schematic diagram showing north (left) to south (right) profile across area F Parkhill site. Horizontal scale is greatly compressed but vertical is to scale. Units 3 and 4 represent old stream channel cut down into older pre-Algonquin deposits. Area F backhoe cut was placed in centre of channel. Unit 2 represents Lake(s) Warren and/or Grassmere/Lundy age deposits whereas Unit 1 is St. Joseph's till associated with Port Huron ice advance.

(see Figure 2.3). Since the sediment is peat and not lake sediment Nipissing itself did not enter the depression. Rather it would appear that the transgression caused the water-table to rise. The stream in the depression became sluggish so that plants falling into it formed peat. The lake itself only invaded up to a point just to the west where the gully opens up onto the Nipissing plain. From this area was recovered a waterworn end scraper with the distinctive brown patina indicating submergence in Nipissing waters (see Ellis and Deller 1986).

The bottom of the peat is disconformable with the underlying clay sediments below the old stream channel. It represents an erosional surface formed before Nipissing or during the Stanley low stage (ca. 10,000 to 5500 B.P.) in the Huron basin. Below this erosional surface and the bottom of the former stream channel was a red, water-laid clay (Unit 2) which correlates with the clay encountered in excavated areas such as Area B (see below). Pollen from this clay is Zone 1 (Figure 2.9). Underlying the red clay below ca. 160-200 cm was a grey clay till (Unit 1). The clay is most likely a product of the covering of the area by glacial Lake(s) Warren around 12,500 B.P. while the till was deposited by the Port Huron ice advance (St. Joseph Till) of 13,000 B.P. Thus, these sediments much pre-date estimates of the age of the Paleo-Indian occupation of the site (see below).

In summary, Area F represents an old stream channel incised into Lake Warren sediments. The stream may have been formed in Main Algonquin or Ardtrea times. If Algonquin/Ardtrea reached a similar level as the later Nipissing transgression, then the low gradient and slow rate of flow would have eroded only a shallow stream channel. The modern peat-filled channel was eroded during the Stanley low stage which began around 10,000 B.P. The lowered levels in the Huron basin at that time increased the gradient of the

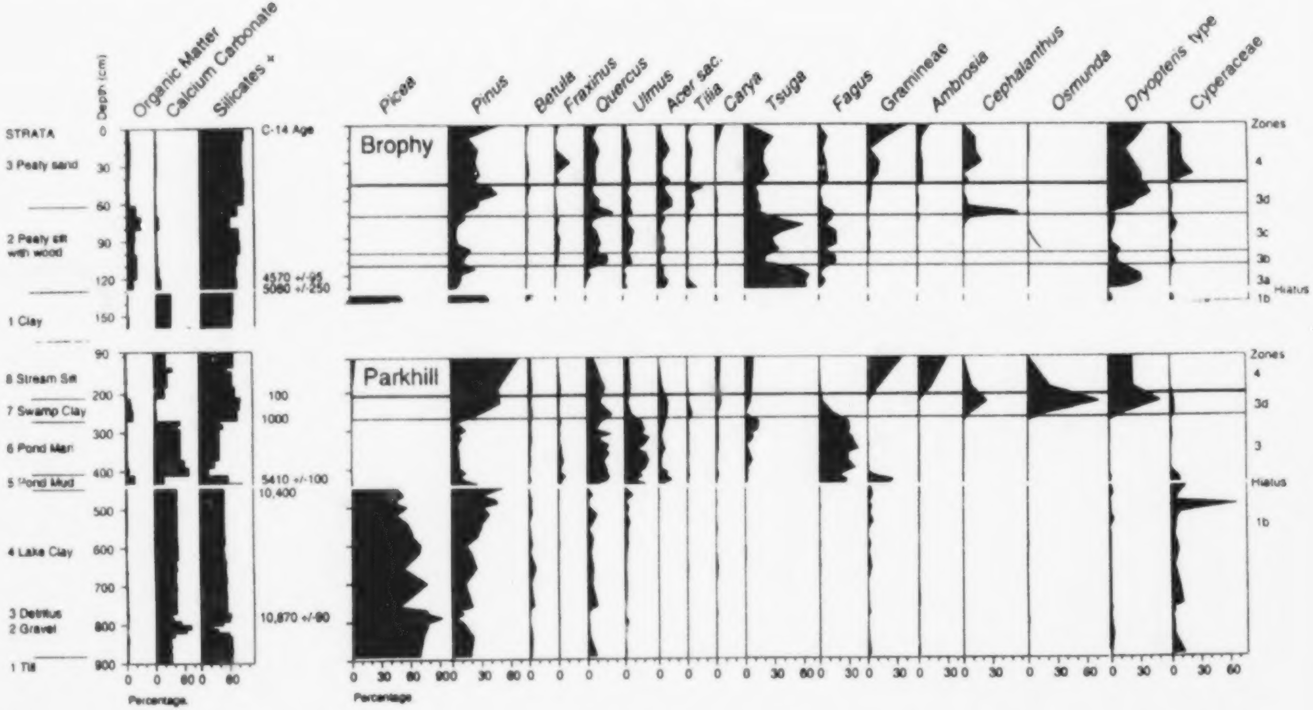

Figure 2.9: Lithology, radiocarbon ages and the most common fossil pollen and spores from the Area F (Brophy section; upper) and Parkhill Creek borehole #234-75 (lower). The lithology component was determined by loss-on-ignition following Dean (1974). The pollen sum was usually over 100 tree pollen; shrub and herb pollen and spores were individually added to the tree pollen counts before their percentages were calculated. The complete pollen and spores counts have been deposited in the North American Pollen Database.

stream which eroded a channel down into older deposits of Warren and possibly, Algonquin/Ardtrea, age. This erosion would have removed any Algonquin/Ardtrea deposits or their correlatives. Following the Stanley low stage, the rise to Nipissing levels led to a lowered gradient in the stream channel and the Unit 3 peats accumulated. During or as Nipissing drained, the stream was sluggish and deposits slowly accumulated through the time of the Zone 3 pollen assemblage. Finally, farming by Europeans caused soil eroded from adjacent fields to fill the top of the depression (Unit 4).

Parkhill Creek Boreholes

Three 5 cm diameter continuous core samples were extracted at a location on a tributary of Parkhill Creek. These core sites were located 1300 metres south of and inland from the Thedford embayment/main Nipissing lake plane and the Parkhill site itself. The boreholes were situated adjacent to a highway at an elevation of ca. 605' (184 m) a.s.l. In general, the same nine unit stratigraphic sequence was encountered in each core, a schematic version of which is included here (Figure 2.10).

The lowest unit (1) generally occurred below a 9 m depth and up to 1.5 metres of it was cored. It consisted of a clay containing abundant pebbles and granules of granite and gneiss, frequently striated carbonate pebbles and numerous sub-angular clasts. This unit is St. Joseph till deposited in the Port Huron ice advance of ca. 13,000 B.P. The associated pollen Zone 1 assemblage (Figure 2.9) is consistent with this interpretation. In some cores, the upper part of this unit (1b) had been reworked by subsequent events. Unit 2 was up to 30 cm thick and was a coarse sand and gravel with clasts up to 5 cm in diameter. This represents a fluvial deposit associated with the formation of the ancient Parkhill Creek system; it post-dates and cuts down into Warren sediments which mantle the surrounding area. During a low water stage post-dating Warren, the creek eroded the Warren sediments. Unit 2 is separated from the overlying Unit 3 by an abrupt lithological contact.

Unit 3 is a ca. 30 cm thick calcareous clay including twigs and spruce needles as well as fossil coleoptera (beetles); it is dated to 10,870+/-90 B.P. (WAT-376). The pollen assemblage continues to be Zone 1 (Figure 2.9). The overlying Unit 4 ranges from 3 to 4.2 m thick. It is a lacustrine deposit of a primarily grey clay except for a more silty clay near the top in some cores. Small amounts of organic detritus and a few molluscs are scattered throughout this unit. Consistent with the C-14 dates, the molluscs suggest a post-Warren age, as such fauna have rarely, if ever, been reported in Warren contexts (P. F. Karrow: personal communication). Throughout the unit, pollen indicates a continuation of the spruce zone. NAP pollen in significant percentages exceeding 10% suggest this layer was deposited in a time of relatively open tree cover (e.g. a more woodland environment). Near the top of the unit, there is an increase in pine pollen (to above 20%) at the expense of spruce, so as a whole the unit seems to approach the time of the pollen Zone 1 to Zone 2 transition.

As noted earlier, that pollen transition is dated by Karrow et al. (1975) to around 10,600 B.P. based on the average of six radiocarbon dates. There are problems in using that estimate as the date of the transition. The dates used by Karrow et al. (1975) are selective and several come from areas to the south such as Ohio where the transition would have occurred earlier

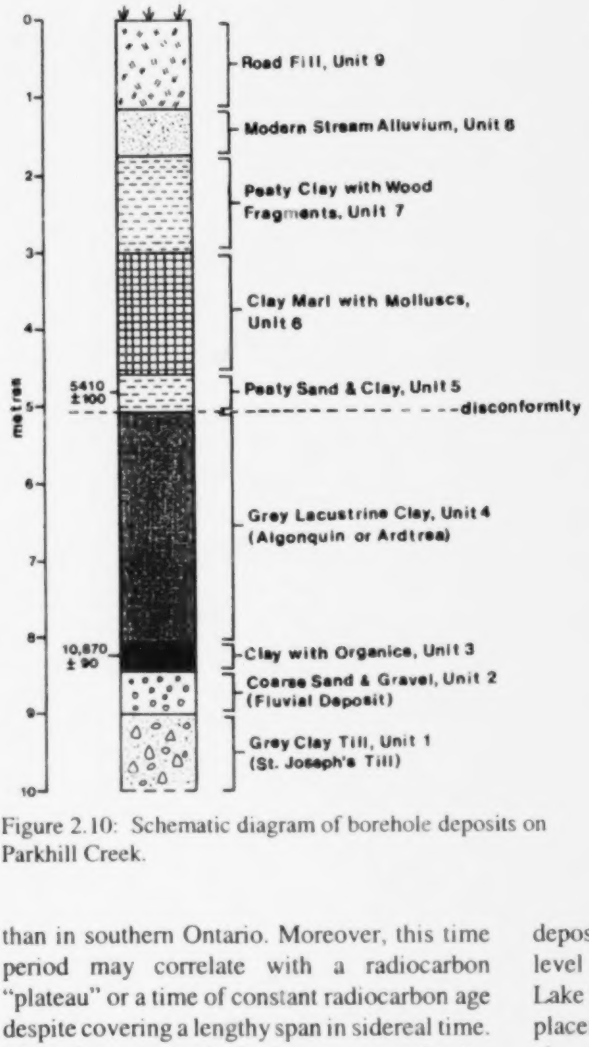
0
1
2
3
4
5
6
7
8
9
10
metres
5410 ±100
10,870 ±90
Road Fill, Unit 9
Modern Stream Alluvium, Unit 8
Peaty Clay with Wood Fragments, Unit 7
Clay Marl with Molluscs, Unit 6
Peaty Sand & Clay, Unit 5
disconformity
Grey Lacustrine Clay, Unit 4 (Algonquin or Ardtrea)
Clay with Organics, Unit 3
Coarse Sand & Gravel, Unit 2 (Fluvial Deposit)
Grey Clay Till, Unit 1 (St. Joseph's Till)

Figure 2.10: Schematic diagram of borehole deposits on Parkhill Creek.

than in southern Ontario. Moreover, this time period may correlate with a radiocarbon "plateau" or a time of constant radiocarbon age despite covering a lengthy span in sidereal time. McAndrews in particular is very wary of using that estimate and strongly believes the transition occurred somewhat later in southern Ontario and after 10,500 B.P. This suggestion is in line with the mapping of critical percentages of pine pollen carried out by Muller (1999:21-43). Muller's (1999: Figure 12) mapping of the final rise of pine above 20% indicates that this certainly occurred in the Parkhill area between 10,500 and 10,000 B.P.

The radiocarbon date as well as the pollen data strongly suggest that Units 3 and 4 date from around 11,000 to at least, and probably more recent than, ca. 10,600 B.P. The thickness and composition of the deposits as well as their thickness indicates they correlate to the rise to (Unit 3), or actually represent (Unit 4), a high-water level in the southern Huron basin. The age estimates agree very well with the traditional estimates for the beginning and end of Main Lake Algonquin or in the revisionist view, Lake Ardtrea (see Figure 2.3). In fact, an initiation of this level around 11,000 B.P. is consistent with recent dates on the beginning of that lake level in areas farther northward in the modern southern Georgian Bay region (Karrow et al. 1995).

Unfortunately, the top of the Unit 4 lake deposit has been eroded so the exact elevation this lake reached and how long it really lasted cannot be determined from these data alone. Given that the top of these lake bottom deposits in the cores is 180 m (590.6 ft.), this level was certainly above the level of modern Lake Huron (177 m or 580.7 ft.). We argue the placement is consistent with a strandline elevation comparable to that of the later Nipissing phase in this area of ca. 184 m. The organic deposit, Unit 3, represents a depositional event around 11,000 years ago, probably as a result of a slowing down of the creek flow associated with the rise of waters to the Algonquin level while Unit 4 represents the actual influx of Algonquin waters as far up the old creek valley as the borehole locations. The continuing Zone 1 pollen indicates this influx occurred only a short time after the Unit 3 event. We reconstruct that a large estuary-like elongation of this lake existed adjacent to Parkhill and the other Paleo-Indian sites in the area and that it extended over a kilometre inland from the actual shore of the pro-glacial lake along the existing creek valleys in the area.

The top of the Unit 4 lake clay is disconformably terminated by an erosional episode (Figure 2.10). The fall of lake levels to the Stanley level increased the stream gradient and led to the erosion of the upper part of the Unit 4 deposits. The sediments overlying this episode represent a sequence similar to that of the Algonquin/Ardtrea incursion. The lower unit (5) is a pronounced horizon of organic materials and consists of a ca. 30 cm thick non-calcareous peaty sand and clay pond mud and dates to 5410+/-100 years B.P. (WAT-392). Consistent with this age is a Zone 3 pollen assemblage dominated by beech (*Fagus*), elm (*Ulmus*) and oak (*Quercus*; Figure 2.9). This pollen assemblage continues into an overlying mollusc-rich clayey marl (Unit 6) which was 1.6 to 1.8 m thick. The age of Units 5 and 6 is consistent with a post-glacial Lake Nipissing placement although there are indications of a Subzone 3d pollen assemblage of much later age near the top of Unit 6. The lithology contact between Units 6 and 7 is abrupt. Unit 7, up to one metre thick, is a non-calcareous peaty clay containing wood fragments. The discontinuity between this level and the underlying unit may be due to the drop in water levels associated with the Nipissing draining and hence, an erosional event due to an increased stream gradient. However, Nipissing probably deposited a beach bar across the valley where the cores were taken to form a pond. The pond persisted to Zone 3d when it filled up to form a button bush (*Cephalanthus*) swamp. Thus, Unit 7 represents a floodplain deposit.

Unit 8 is 1 to 1.4 metres of historic stream alluvium containing a Zone 4 pollen assemblage. The uppermost unit (9) represents a ca. 0.75 metre thick fill deposited during the construction of the nearby highway.

In summation, the boreholes revealed a long and relatively complete sequence spanning the period since Port Huron ice retreat from the area. Although there is a hiatus during the time of the Stanley low stage beginning just before 10,000 B.P., sediments are present of, or correlated to, every major high water stage except Lake Warren(s).

Excavated Areas

Some information on paleoenvironmental and geological matters was derived from the main excavated site Areas B, C and D. All of these areas had been cultivated. The plowzone averaged 20-25 cm thick. Most cultural material was recovered from this zone and it seems evident that the actual Paleo-Indian occupation levels were at some point close to the modern surface in this level. Pollen was recovered from the excavated areas at Area B near Paleo-Indian Feature 9. This pollen was sparse and poorly preserved but the analyst (McAndrews) is confident of his interpretation. A sample from the plowzone surface (Table 2.1) is assigned, not surprisingly, to the modern Zone 4. The subsurface plowzone is Zone 3 as there is no corn pollen or pollen characteristic of the more open vegetation cover associated with land clearing. This assemblage represents the nature of the vegetation cover just prior to Euro-American agricultural activities and

Table 2.1: Pollen Frequencies, Area B, Parkhill Site.

Genera/Species	Ground Surface, 960/65	Ploughzone, North Wall 1015/60	Subsoil, Under Feature 9 1005/65
Spruce	-	3	50
Pine	70	52	12
Birch	2	1	3
Ironwood	2	-	-
Oak	3	1	1
Maple	-	2	-
Hemlock	3	10	-
Hickory	2	1	1
Basswood	4	-	-
Ragweed	3	-	-
Chenopod	4	-	-
Grass	38	-	3
Maize	10	-	-
Sage	1	-	-
Sunflower type	-	3	-
Chickory type	9	11	-
Sedge	4	-	1
Pollen Sum	156	84	71
Club Moss	2	5	1
Shield Fern Type	44	10	-
Flowering Fern	5	5	-
Bracken	5	-	-
Sphagnum	-	2	-
Indeterminable	19	9	-
Unknown	-	3	-
grains g^{-1} dry weight	1041	175	71
Pollen Zones	1	3	4

represents Zone 3d.

Subsoil Paleo-Indian cultural materials were restricted to two contexts. The first included cultural features which had penetrated into the underlying sediments and will be discussed in a later section. The remaining subsoil cultural materials were in contexts reflecting post-occupational disturbances at the site. This largely included numerous root disturbances, rodent burrows and features resulting from historic period activities. An exception was some material encountered at Area D. As will be discussed in later chapters, the Area D excavations encountered concentrated Paleo-Indian materials in a southeast to northwest trending feature (assigned feature #30). This feature represents an erosional event. Plotting of the depth of the Paleo-Indian material relative to that of later prehistoric occupations in the feature shows that the Paleo-Indian materials primarily occur deeper in the sediments. There is some mixing with later materials due to the construction of features by later occupants and other disturbance processes intruding material into the sediments. Thus, most Paleo-Indian material was eroded into and concentrated in the feature before later occupations. This erosional feature trends toward Area F. The later prehistoric materials in it, and the cultural features cutting into it, are post-Nipissing in age (Late Archaic "Smallpoint"; Early Woodland). Also, the C-14 dates on cultural pits intruding into the erosional feature are on the order of 3000 to 2500 B.P. (Ellis 1994c, 1998). Therefore, this erosional episode is probably associated with the Nipissing transgression in the area and perhaps, with the fall to lower lake levels just post-dating this event around 4500 to 4000 B.P.

The unit immediately underlying the cultivated layer, and presumably at least some of the plowzone itself prior to cultivation and soil formation, represent a complex mixture of sediments. Grain size analyses and microscopic analyses of these sediments were done on samples obtained from Area B by A. J. Cooper (1975). The sediments were derived from glacial deposits and consisted primarily of a sandy loam intermixed with pockets of a silt loam. Also, in some areas, pockets of clay had intruded from underlying levels (see below) and there were some areas of laminated sands. Apparently, the "soft" nature of the sediments, combined with exposure to high loading action, led to much deformation. Although analyses were not conclusive, the loams appear to be derived from lacustrine sediment. However, some samples appear to be of aeolian origin. A sample from the sandy loam just under Paleo-Indian Feature 9 (Table 2.1) contains pollen of Zone 1 (Roosa and Deller 1982:4-5) not Zone 2 as was earlier reported (Roosa 1977a:349, 1977b:90).

Underlying the loams and sand was a red, probably water-laid, clay which correlates with the clay underlying the stream channel at Area F. At Area F, this clay overlies till. At other exposures around the site (see Cooper 1979), this till is the St. Joseph Till of the Port Huron ice advance. Thus, the red clay must post-date 13,000 B.P. Since the Algonquin, Post-Algonquin and Nipissing lakes did not flood the excavated site areas, the clay as well as the complex overlying sands and loams were probably deposited by pro-glacial Lake(s) Warren. However, it is possible that some sediments may be deposits of the short-lived Lakes Grassmere/Lundy at ca. 12,400 B.P. In either case, this means the Zone 1 pollen from under Feature 9 at Area B could be a product of events much before the occupation of the site by

Paleo-Indians. This evidence does not mean that the Paleo-Indian occupation of the site was not during the time represented by pollen Zone 1 because this zone spanned much later time. It only means the pollen sample itself is probably earlier.

In summary, the excavated areas are underlain by lacustrine clays and other sediments of a probable Lake Warren or Lakes Lundy/Grassmere age. After the draining of these lakes and before the invasion of vegetation onto their old lakebeds, the surface was probably subjected to aeolian processes including perhaps dune formation. This interpretation is suggested by the sediments of possible aeolian origin examined by Cooper (1975) and the presence of extant dunes developed on Warren deposits elsewhere in the region (Cooper 1979:35). At a subsequent time, probably after vegetation was established on the site, it was occupied by the Paleo-Indian groups.

Summary

Figure 2.3 correlates the data from Area F, the boreholes and the excavated areas with each other and presents the two general frameworks outlined earlier. Our data provides new information which documents and refines the geological and paleoenvironmental history of the area. Especially notable is the documenting of Lake Algonquin or Ardtrea sediments and the nature of the environments during at least part of the tenure of that lake in the area. Unfortunately, other than providing gross maximum and minimum age estimates, these data do not allow a firm placement of the Paleo-Indian occupations in time and by extension, into an environmental context. This age must be inferred using other lines of evidence given in the next section.

Site Age and Setting

Age of Fluted Points

Radiocarbon dates are scarce for fluted point associated occupations in the Great Lakes area. In the Western United States, dates indicate these occupations began as early as 11,500 B.P. with assemblages including Clovis points (Taylor et al. 1996). Dates on assemblages with Folsom points and the succeeding unfluted forms suggest fluted points fell out of use by ca. 10,400-10,200 B.P. (Frison 1983, 1991; Frison and Stanford 1982; Haynes et al. 1984). Acceptable dates from east of the Great Lakes place the beginning of Early Paleo-Indian occupations around 11,000 B.P. or later (Haynes et al. 1984; Levine 1990). Dates elsewhere, including some recently reported ones from sites like Arc in western New York state, also indicate the use of fluted points was abandoned shortly after 10,500 B.P. to be replaced by Late Paleo-Indian point forms (Ellis et al. 1998; Goodyear 1982).

Geochronological estimates of the age of fluted points in the Great Lakes area have proven useful and popular (e.g. Farrand 1977; Jackson 1978, 1983; Mason 1958, 1962; Meltzer 1984; Roberts 1984). The position of finds relative to landforms such as glacial till plains, moraines and pro-glacial lake strandlines has been used to suggest the maxium age of the sites. These data suggest some of these finds could be as old as 14,500 B.P. Other sites and findspots are in areas covered by ice or pro-glacial lakes until ca. 12,000 to 11,500 B.P. (Jackson 1983). At the Fisher Paleo-Indian site in southcentral Ontario a strandline crosses the centre of the site below which Paleo-Indian artifacts occur (Storck 1997). If that strandline is Main Algonquin, and if Main Algonquin dates to only as late as 11,500 B.P. (Kasczycki 1985; Larsen 1987), then an age for fluted points more recent than 11,500 B.P. is indicated. Overall, when compared to the C-14 dates noted above, the geochronological estimates in the 14,500 to 11,500 B.P. range seem inflated.

A better estimate of a maximum possible age of these occupations is the data from Parkhill and vicinity where no fluted point sites or findspots have been found in areas which were apparently flooded by Main Algonquin/Ardtrea but at least 17 sites occur just above and lining the apparent margin of that lake (Deller at al. 1986; see Figure 1.2). The data from Parkhill indicate water levels did not rise to a level comparable to the Parkhill site until around 11,000 B.P. , so the area below that level was available for human occupation prior to that time. The absence of evidence for such an occupation on the available lakebed of prior to 11,000 B.P. indicates the sites date after that time although it is possible that the rise to that lake level destroyed earlier sites. In any case, because C-14 dates indicate older fluted points in the west than in the east by as much as 500 radiocarbon years, the use of these tools overall can be interpreted as a west to east progression. Thus, given the intermediate position of the Great Lakes area between these extremes, a maximum age estimate of just before ca. 11,000 B.P. seems the most reasonable with present data.

As for a minimum age, the C-14 dates and geochronological data are complementary. In both east and west, the radiometric dates suggest fluted points fell out of use between ca. 10,500 and 10,000 B.P. Geochronological estimates are consistent with this estimate. In areas of Ontario such as the southcentral region where the strandline of Algonquin/Ardtrea can be traced, fluted points sites are unknown on its lakebed but numerous sites line the landward side of the beach (e.g. Storck 1982). The same relationship holds in other areas such as around the Parkhill site even though this distribution is related to an inferred level of Lake Algonquin or Ardtrea. Moreover, it is worth emphasizing that in the Parkhill area there is definitive evidence of Late Paleo-Indian occupation characterized by unfluted Holcombe and Plano points well within the inferred lakebed of Algonquin/Ardtrea (Ellis and Deller 1986). Because this lake drained around 10,400 B.P., fluted points pre-date that draining and a shift to the use of unfluted point forms probably occurred shortly thereafter as was the case in the west. Therefore, as a whole, an age range of 11,000 to 10,400 B.P. is viewed as a very good estimate of the antiquity of fluted points in the Great Lakes area.

• Age of the Parkhill Site

With the above age estimates, it is possible to provide more specific suggestions as to the environmental setting at Parkhill during the Paleo-Indian occupation. As noted earlier, the pollen from Unit 4 in the boreholes strongly suggests the lake persisted to at least, and most likely more recently than, 10,600 B.P. in the Parkhill area. On this basis alone, the area predominantly had a spruce zone cover during the time span suggested above for the occupations. Further, other lines of evidence suggest an occupation in the spruce zone.

First, as suggested earlier, the spruce zone seems to have persisted beyond the 10,600 B.P. estimate long attributed to it by Karrow et al. (1975) and in some areas certainly extended beyond even 10,000 B.P. (e.g. McAndrews

1984:170; Miller and Morgan 1982; Pilny et al. 1987:618). The variation in dates of that transition can be most easily seen to be due to the time-transgressive nature of the event. That is, the replacement of spruce by pine occurred roughly first in the southwest of the southern Ontario peninsula and then spread northeast (see Bernabo and Webb 1977; Jackson 1978; Muller 1999; Roberts 1984). Therefore, it is most likely that the spruce vegetation persisted to 10,500 B.P. in more northerly areas such as at Parkhill and as noted earlier, Muller's (1999) mapping of the rise of pine pollen above 20% strongly suggests the transition had to occur after 10,500 B.P. in that area.

Second, some of the variation in the dating of the spruce/pine zone transition seems to be due to specific locational factors beyond latitude. For instance, there is evidence that spruce vegetation and its associated insect fauna persisted longer in areas such as along pro-glacial lake shorelines including Algonquin/Ardtrea perhaps due to the cool winds blowing off the pro-glacial lakes. It is evident for example, in the consistent appearance of arctic-alpine insect species at lake marginal sites (Ashworth 1977:1633; Morgan et al. 1983:358). Again, Parkhill's location on a strandline make it likely the spruce zone persisted to at least if not beyond ca. 10,500 B.P. in the site vicinity.

Finally, there are excellent data which indicate the specific fluted point phase represented at Parkhill is not the latest in the Great Lakes area (see Deller and Ellis 1992b; Ellis 1994b; Ellis and Deller 1997). Rather, Crowfield points (see Deller and Ellis 1984) seem a better candidate for a terminal fluted point status, given their close resemblances to unfluted, demonstrably post-Algonquin/Ardtrea (Ellis and Deller 1986), Late Paleo-Indian, Holcombe forms. In short, the industrial complex represented at Parkhill, pre-dates the suggested ca. 10,400 B.P. terminal date for fluted point use in the region. Elsewhere, it has been speculated that the Parkhill Paleo-Indian industry dates to 10,800 to 10,500 B.P. (Deller and Ellis 1988) although we should stress these are radiocarbon years – there is growing evidence that much more than 300 sidereal years is represented in these radiocarbon time periods (e.g. Curran 1996; Ellis et al. 1998). In any case, granted these estimates of the age of the site, again, this evidence increases the probability that Parkhill was occupied during a vegetation cover contemporaneous with Units 3 and 4 identified in the Parkhill Creek boreholes and as such, this information has a direct bearing on the setting of the site when it was occupied.

Setting of the Parkhill Site

Turning to the physiographic setting of the site, and of major importance, the Parkhill Creek boreholes revealed deposits representing a high water level in the southern Huron basin during the ca. 11,000 to beyond 10,500 B.P. period. Although such a high water level has long been expected based on work farther to the north (Karrow et al. 1975), the Parkhill cores provide the first directly dated evidence of this high water level in the southernmost part of the basin. Regardless of whether they represent Main Algonquin or a Post-Algonquin Lake Ardtrea, these deposits indicate an inlet to the lake was present at the mouth of Parkhill Creek adjacent to the Parkhill site and that the strandline of this lake approached or was identical to that of the later Nipissing transgression.

The physical setting of the site, and specifically, the elevation reached by the waters of this lake, is not easily discerned because of the erosion of the top of the Parkhill core deposits and the fact they are lake bottom sediments -- we only know it went above modern Huron levels and reached at least 180 m a.s.l. However, we believe that the lake of the 11,000 to post-10,500 B.P. period did reach the level of 184 m long attributed to it and thus, it is possible to use modern topography to sketch in the lake near the site area (see Figure 2.11). The nature of the modern Parkhill Creek valley where the bore holes with the lake deposits were found would have constricted the waters. Therefore, a large estuary did form extending up that valley from adjacent to the site on the southwest to a considerable distance inland. At the very least, the presence of lake deposits 1.3 km inland from the Thedford embayment up the Parkhill Creek valley south of the site indicate there is no doubt the Parkhill site was adjacent to a lake, and a lake estuary at that, at the time it was occupied; this evidence refutes claims to the contrary (e.g. Storck 1997:250). As will be discussed in a later section, the setting of the site beside a major water crossing is very similar to those seen amongst modern northern hunters as they intercept groups of caribou impeded and slowed by crossing the waters (e.g. Loring 1997).

The paleoenvironment of the lake itself is poorly known. Studies of lake deposits of this age have revealed that life was present in the lake. Several species of molluscs and ostracodes are reported, including species indicating boreal and cold-water near shore conditions (Karrow et al. 1975, 1995) which is expected in a pro-glacial lake. Indirect evidence indicates fish were present in the lake (Karrow et al. 1975:65) and were undoubtedly pursued by Paleo-Indians but it is unknown just how common these were and how important they may have been in Paleo-Indian diets.

Turning to the vegetation cover of the time, as previously noted, the pollen identified in the boreholes includes substantial percentages (over 10%) of non-arboreal pollen such as sedges (Cyperaceae), grass (Gramineae) and other herbs (Figure 2.9) throughout both units 3 and 4 suggesting the site was occupied by an open vegetation cover throughout that time span. This interpretation is consistent with Muller's (1999) mapping of critical percentages of non-arboreal (NAP) pollen alluded to earlier which also indicates that the area remained quite open until around 10,500 B.P. However, the relatively high percentages of spruce pollen in the units (ca. 40 to 60%) indicates trees were present in the area (e.g. it was by no means a tundra), probably restricted to more sheltered areas. The presence of spruce needles in Unit 3, which represents the slowing of the creek as water levels rose to the Algonquin/Ardtrea level, indicates these trees were present from the beginnings of this high water stage and corroborate the pollen evidence.

The fossil coleoptera remains from at least Unit 3, some implications of which were reported elsewhere (Morgan 1988; Morgan and Morgan 1980; Morgan et al. 1982, 1983), also corroborate the pollen and plant macro-fossil remains from that layer. Species in this small micro-fauna include: a ground beetle of the family Carabidae (*Bembidion mutatum* G & H), an aquatic beetle of the family Gyrinidae (*Gyrinus bifarius* Fall), a rove beetle (*Acidota quadrata* Zett.), and bark beetles of the family Scolytidae (*Ips borealis* Sw. and *Phloetribus piceae* Sw.). These species characteristically inhabit a diversity of habitats in tree-line and

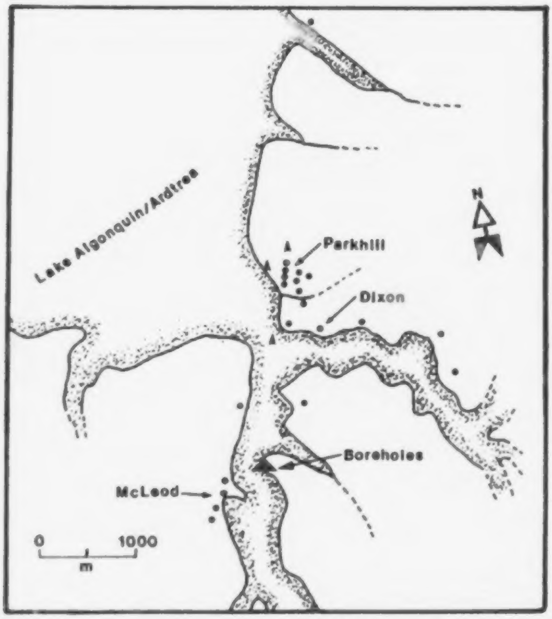

Figure 2.11: Estimated extent of Main Algonquin or Ardtrea assuming an elevation of 605' in the Parkhill vicinity. Circles: sites or site areas; Points: isolated finds of Barnes points.

boreal forest areas (e.g. Bright 1976; Lindroth 1963) and reflect those habitats one would expect along the creek as it slowed and was flooded by Algonquin or Ardtrea. *Bembidion mutatum* prefers open bare patches or patches of grasses and herbs in fine moist soil while *Aciodata quadrata* prefers living in leaf litter under shrubs along the edges of water. In contrast, *Phloetribus piceae*, as the name implies, is a bark beetle which feeds on spruce. The combination of open ground and bark beetle species again suggests an open woodland landscape although it must be noted that *Phloetribus piceae* is a typical forest inhabitant today rather than a species of more open areas. However, it is common in the Late Pleistocene Great Lakes to get a greater diversity of species than in modern areas and especially to find asynchronies between the plant and insect species probably because the insect species are able to colonize newly available areas faster than the plant species and may be more accurate indicators of climatic conditions (Morgan et al. 1983:357-358; Schwert et al. 1985:223).

In any case, at least initially around 11,000 to 10,800 B.P. the coleoptera species suggest an open spruce woodland with many available micro-habitats although we do not know how long in time this persisted into the subsequent Unit 4 time when actual lake waters invaded the prehistoric Parkhill Creek area beside the site. For what it is worth, the Eighteen Mile Creek site located about 35 km due north of Parkhill has a similar insect assemblage indicating comparable conditions to Parkhill persisted there until at least ca. 10,600 B.P. (Ashworth 1977). Regardless, the Parkhill data indicates such open environments were present in the area at the time of fluted point users of ca. 11,000 to 10,400 B.P. regardless of whether or not the Parkhill site per se was occupied precisely at the time of the preserved lake deposits. There have been some who have argued that Early Paleo-Indians inhabited only boreal forests in the Northeast/Great Lakes (Custer and Stewart 1989) but the Parkhill borehole data and several other recent studies (e.g. Karrow et al. 1995; Muller 1999) refute such a polemic. A diversity of environments seem to have been lived in by Early Paleo-Indians in southern Ontario ranging from open woodlands earlier on which persisted longer in more northeasterly areas, to boreal forests later in time and in the southwesternmost areas (Deller and Ellis 1988; Ellis and Deller 1997).

PART II: LITHIC ASSEMBLAGES by Christopher Ellis

CHAPTER 3

INTRODUCTION AND BACKGROUND

In this section, a detailed description and analysis of the stone artifactual material recovered from the Parkhill site is presented which focuses on the explanation of patterned morphological variation in the assemblage. Following the lead of Witthoft (1952), Wright and Roosa (1966), MacDonald (1968) and others, this explanation is attempted in terms of a multi-variate series of interacting, immediate or *proximate/ontogenetic* causes (see Daly and Wilson 1978:8-12; Ellis 1984:1-2) which are presumed to be operative in any system of tool production and use. These causes include: lithic raw material size, shape and other properties, manufacturing procedures such as patterns of flake removals from cores and implements, resharpening, recycling, hafting or lack thereof, discard in manufacture prior to use, tool use *per se*, aesthetics, and so on. Such causes are usually referred to collectively as stylistic and functional in the sense of Sackett (1973:20). The result of explanation at this proximate level are models of technological structure (see Knudson 1973; Sheets 1975) in which the interrelationship of all of these causes and their ties to formal variation are explicated. These constructs are often diagrammed as flow models which trace the lithic production and use system from an input of lithic raw materials through to the final output of discarded products.

In the remainder of this chapter, background information relevant to the following artifact analyses are presented. First, a review is provided of terminology and assumptions underlying the analyses and data presentation. Second, the attributes and variables recorded for the analyses of the tool/preform and waste flake assemblages are summarized and their methods of measurement specified.

Terminology and Assumptions

In the analyses, the tools/preforms from the site are viewed from two perspectives. First, in Chapter 4, they are viewed from the perspective of information they can provide about the primary stages of tool manufacture involving raw material selection, core forms, and tool blank production. In essence, from this perspective they are not treated as tools but instead, as flake and core blanks. This analysis results in the recognition of several types of blanks which are significant in terms of delineating variation in the sequences of primary reduction and the various stages within those primary reduction sequences. Since the focus is on artifacts as blanks in that analysis, measurements for blank types are presented only where the blank has not been much reduced through its use as a tool and thus, is an accurate measure of the original blank's characteristics.

Second, in Chapters 5 and 6, the artifacts are viewed as tools/preforms rather than as flake blanks. Here the focus is on delineating the later stages of tool manufacture and with explaining variation in the assemblage in terms of proximate factors such as resharpening and recycling, hafting and use. These analyses result

Table 3.1: Tool Classes and Types Used in the Analysis, Parkhill Site.*

Artifact Type/Class
Fluted Points*
Fluted Preforms*
Other Fluted Bifaces
Unfluted Preforms*
Channel Flake Points*
Large Alternately Bevelled Bifaces*
Small Alternately Bevelled Bifaces*
Backed Bifaces*
Marginally Retouched Bifaces
Biface Fragments
Trianguloid End Scrapers*
Large Parallel-Sided End Scrapers*
Laterally Notched End Scrapers
Fluted End Scrapers
Bi-Bitted End Scrapers
Narrow End Scrapers*
Offset End Scrapers*
Other End Scrapers
Simple Beaks*
Hafted Perforators*
Micro-Piercers or Gravers
Denticulates
Notch/Borer/Denticulates
Concave Side Scrapers with Spurs*
Other Side Scrapers
Retouched Flakes
Other Unifaces and Fragments

*these items are regarded as types rather than classes.

in the recognition of several tool classes (Table 3.1). The classes are largely a descriptive and organizational convenience although they may be a gross measure of certain factors such as use-variability (for example, it should be clear that the vast majority of items in the graver tool class were used for tasks different than those in the "other side scraper" tool class even though within each class there was probably considerable use variation).

In addition to the tool classes, the analyses reported here also recognize what we can call artifact *types* (Table 3.1). Some of these types can be represented by only a single item at Parkhill. Nonetheless, these types are known from other sites and thus, are a recurrent form. The types are *not* simply a descriptive convenience. They are singled out because they isolate important sources of variation in the assemblage resulting primarily from variation in hafting methods (e.g. laterally notched versus unnotched trianguloid end scrapers), discard in manufacture (e.g. fluted preforms), and from intended use. With regard to the last named, it is stressed that no detailed use-wear studies were conducted. Nonetheless, on theoretical grounds several of the types (the asterisked items on Table 3.1) are strongly inferred to have been designed for use in certain task contexts. Items in a type are recurrent forms which are quite homogeneous internally, involve a large number of consistent decisions in their production, and which differ markedly in morphology, design and working edge characteristics from those items placed into other types. For example, it is clear from their markedly different designs that fluted points were intended for use in different contexts (excluding potentially recycled examples) than trianguloid end scrapers (see Ellis [1984, 1993], Ellis and Deller [1988], for a more detailed discussion of this rationale).

The above discussion is not meant to deny that there may be some use-variability within these types but importantly, it is felt that this is very minor compared to the gross classes such as end scraper or side scraper or biface or beaked scraper often used in the past to characterize use-variability by other researchers (see, for example, MacDonald 1968). In essence, the types recognized here appear to be more sensitive indicators of activity-variability than the gross classes. For example, Ellis and Deller (1988:124) argued that the morphological tool class "beaked scraper" (e.g. Storck 1979) included two or more types on morphological grounds: a form with a convex bit which we called narrow or nosed end scrapers, and a form with a thick more pointed bit we called beaks. It is clear based on the morphology of the working edges alone that these two types could not have served in the same activity. Importantly, use-wear analyses of such items by Tomenchuk (1997:119) have confirmed activity variation associated with the two different working edge forms. Neither is the above argument a denial of the fact that some of these types were multi-functional. For instance, some types which incorporate markedly different working edges on the same tool such as concave side scrapers with spurs definitely had more than one use if only to carry out different operations within the same task. However, it is suggested that the range of uses for these tool types may have differed from the intended range of uses of other tools. Finally, and despite claims to the contrary (Storck 1997:246), it must be stressed that these arguments also do not mean that I believe that studies of tool morphology/design necessarily provide better indications of task variation than do use-wear studies. As has been explicitly stated elsewhere (and I do not know how we could be more explicit), use-wear studies: "have the potential to provide the most accurate measure of behavioural or activity variation related to tool task applications" (Ellis and Deller 1988:123). My objection is that we can not be sure the use-wear studies have lived up to that potential (e.g. one can question their accuracy; Ellis and Deller 1988:122-123).

A difficulty encountered in the description of the Parkhill material as tools/preforms is that there is evidence of recycling. For example, trianguloid end scrapers could be recycled into gravers or micro-piercers. Despite this fact, these recycled items can provide information about the original tool types such as trianguloid end scrapers in this example. Moreover, ethnographic/experimental data suggest (Ellis 1984:368-369) that chipped stone tools have relatively short use-lives. Therefore, I would suggest that the vast majority of these recycled tools may have actually served in both their original form and then their recycled form, *on the site itself*. Indeed, this is demonstrably the case in some instances. For example, Figure 6.10g served first as a trianguloid end scraper on the site during which its bit was broken and then, one edge was modified for use as a different tool form on the site prior to discard.

Based on the assumption that a tool served for both its original and recycled use on the site, throughout this report the totals given for any tool type or class in the descriptions include not only the number which were serving as that tool form upon discard but also the number of items which provide data on that tool form and presumably served as that tool form on the site. For instance, a trianguloid end scraper recycled into a piercer or graver could be discussed in the context of each of these

Table 3.2: Recycled Items in Parkhill Site Assemblage.*

Field Catalogue #	Original Form	Recycled Form
22	Trianguloid End Scraper	Narrow End Scraper
87	Fluted Biface	Piercer or Graver
213	Trianguloid End Scraper	Piercer or Graver
214	Offset End Scraper	Retouching of proximal end
215	Trianguloid End Scraper	Bi-Bitted End Scraper
395	Trianguloid End Scraper	Narrow End Scraper
406	Double Alternately Retouched Side Scraper	Multiple Piercer or Graver
482	Trianguloid End Scraper	Piercer or Graver
499	Large Parallel-Sided End Scraper	Simple Beak
520	Large Parallel-Sided End Scraper	Simple Beak
769	Trianguloid End Scraper	Piercer or Graver
779/788	Trianguloid End Scraper	Narrow End Scraper
1104	Trianguloid End Scraper	Bi-Bitted End Scraper
1122	Trianguloid End Scraper	Piercer or Graver
1123	Concave Side Scraper with Spur	Narrow End Scraper

*only items where the original form prior to recycling can be determined are listed.

separate tool types. A similar rationale is held in characterizing site areas or areas as a whole for purposes of inter-assemblage comparisons. Thus, although 330 separate items are in the site tool/preform collections, a total of 345 is also presented since fifteen items (listed on Table 3.2) can be assigned on this basis to two different types and/or classes. There is evidence that more than these fifteen tools were recycled but the original tool type or class can not be readily determined in the remaining instances. As a result, those particular tools are totalled and listed only once in their recycled form.

Attributes and Variables

Data were collected on a wide range of tool/preform characteristics relevant to the goals of the analyses. Descriptive terminology employed to describe artifacts is shown on Figures 3.1 to 3.3.

Unifacial Tools

General Variables

1) Weight: This variable is given to .01 grams.

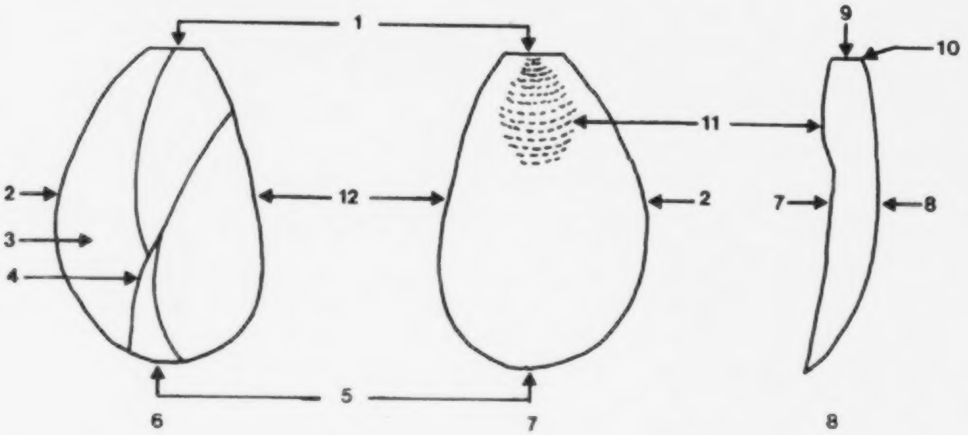

Figure 3.1: Flake blank landmarks. 1: proximal or platform end; 2: right lateral edge; 3: dorsal scar; 4: dorsal ridge; 5: distal end; 6: dorsal view or surface; 7: ventral view or surface; 8: longitudinal section; 9: striking platform; 10: platform/dorsal surface juncture; 11: bulb of force; 12: left lateral edge.

2) Maximum Length: This measure and other continuous size variables were taken to the nearest 0.1 mm. Length is the maximum dimension of the item parallel to the axis of percussion (White 1963:12).

3) Maximum Width: This measure is the maximum dimension of the flake along a line at right-angles to the axis of percussion.

4) Maximum Thickness: This measure represents the distance between the dorsal and ventral surfaces beyond the area of bulbar swelling or thickening (Wilmsen 1970:19).

Proximal End

1) Platform Length: If present, the length of the striking platform between the lateral edges was recorded (Wilmsen 1970:15).

2) Platform Width: This measure refers to the maximum width of the platform between the dorsal and ventral surfaces at right-angles to platform length.

3) Platform Lip: The presence or absence was noted of platform lipping (e.g. the overhang of the platform above the bulb of force).

4) Platform Angle: This angle was measured using a contact goniometer to the nearest 5° increment. It is the angle at the proximal end between the major platform surface and the main dorsal flake surface in longitudinal section.

5) Platform Surface Preparation: Forms of platform surface or preparation were noted, based largely on the typology developed by Frison and Bradley (1980:27-30). More than one of these preparations can occur on a single platform.

a) Cortical;

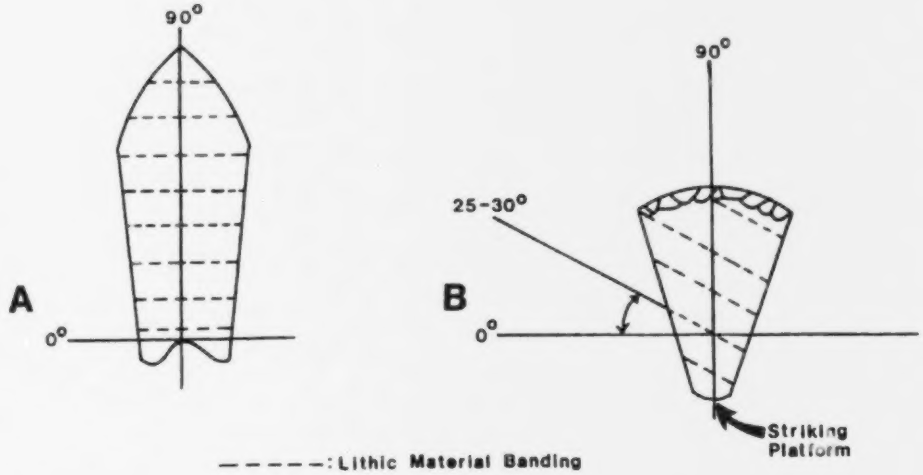

Figure 3.2: Measurement of Banding Orientation on Collingwood Chert Points (A) and unifaces (B).

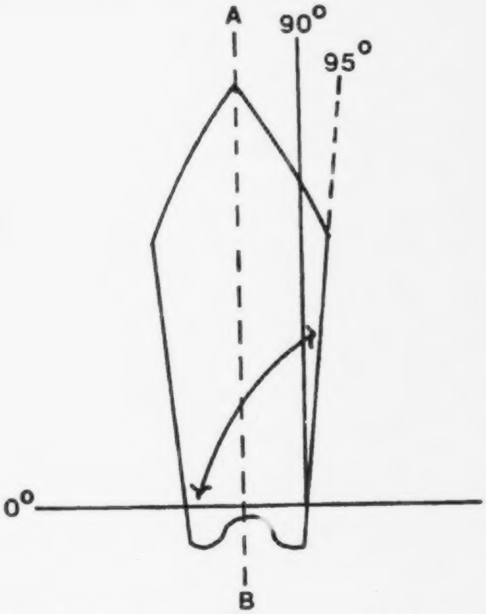

Figure 3.3: Measurement of face-angle for fluted bifaces. A-B: medial point axis.

b) Faceted: The platform surface exhibits several small flake scars from purposeful platform preparation;

c) Dihedral: The platform surface has two major facets separated by a centrally located ridge;

d) Ground: The juncture of the dorsal flake surface and the platform has been dulled to thicken, and thus, prevent collapse, of the core edge under the detaching pressure or blow;

e) Isolated: The outline of the platform viewed from the dorsal surface has a "pointed" appearance which was purposefully created in order to focus and make more precise the force of the detaching blow;

f) Reduced: The dorsal surface of the

flake adjacent to the platform has been trimmed to remove overhang and thus thicken and strengthen the core edge;

g) Flat: The surface of the platform is unaltered and lacks cortex.

Dorsal Surface

1) Dorsal Scars: The number of dorsal scars (excluding scars from platform reduction) was recorded as an indication of the number of previous flake removals from the same area of the core as the flake under examination.

2) Dorsal Scar Orientation: Several orientation states for dorsal flake scars were recorded following Deller and Ellis (1992b:147-158).

a) Parallel-Unidirectional: The scars parallel the axis and direction of the flake under examination;

b) Parallel-Bidirectional: The scars parallel the direction of the flake under examination but originate from both the proximal and distal end;

c) Convergent-Unidirectional: The scars converge towards the axis of percussion of the flake under examination but originate from the same platform end;

d) Convergent-Bidirectional: The scars originate at both ends of the flake and converge towards the flake's mid-line;

e) Transverse: The scars are at right-angles to the axis of percussion of the flake under examination;

f) Flat: The dorsal surface is mainly or completely unflaked.

3) Lateral Edge Orientation: The orientation of the flake's lateral edges in plan view in relation to the platform was recorded following White (1963:9). Three states were recognized:

a) Parallel;

b) Contracting;

c) Expanding: If the edges expanded from the platform the angle between the lateral edges as they would intersect at the platform was recorded to the nearest 5° increment.

Ventral Surface

1) Bulb Type: The appearance of the bulb of percussion was noted. Three states were recorded:

a) Flat or Diffuse: The bulb is absent or is difficult to detect;

b) Moderate: The bulb can be easily detected and is well-defined;

c) Pronounced: The bulb projects markedly from the flake underside.

2) Other: Ripples or Wallner lines (Cotterell and Kamminga 1976:108) and other landmarks were noted for each flake's ventral surface.

Transverse Section

1) Transverse Shape: This was recorded by viewing the proximal end in transverse section with the dorsal surface to the top. A variety of specific forms were recorded (Figure 3.4).

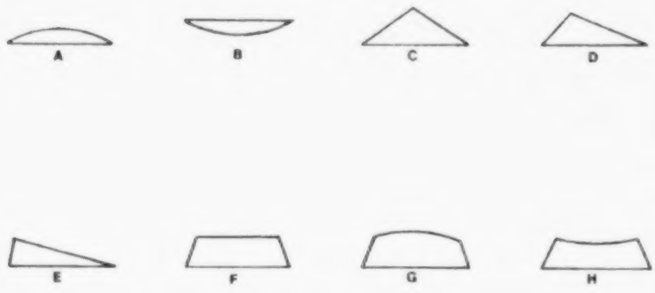

Figure 3.4: Transverse cross-sections, unifaces. Dorsal flake surfaces are to top, ventral surfaces to bottom. A: plano-convex; B: convex-plano; C: triangular; D: offset triangular; E: wedge-shaped; F: trapezoid; G: convex-trapezoid; H: concave-trapezoid.

2) Core Facet Angle: Following Judge (1973:146-148), the angle between the major dorsal facets was recorded on items with pronounced dorsal ridges.

Longitudinal View

1) Curvature: The longitudinal curvature of a flake was recorded by matching it in profile to a series of concentric circles drawn at one cm diameter intervals.

2) Curvature Placement: If the flake was not symmetrical in its curvature (e.g. the curvature was more pronounced towards the distal or proximal end), this placement was noted.

Other Characteristics

1) Distal Termination: The termination of the flake, whether feathered, hinged or stepped (see Cotterell and Kaminga 1979: Figure 105), was recorded.

2) Banding Orientation: For items on Collingwood variant chert, the angle of the banding edges in relation to the flake's longitudinal axis was recorded to the nearest 5° increment on a 0-90° scale. Items with banding at right-angles have 0-5° banding in the method of measurement while banding following the longitudinal axis was recorded as 85-90° (Figure 3.2).

Retouch Characteristics

1) Retouched Surface: The placement of retouch, whether on the dorsal or ventral ("inverse retouch") was recorded.

2) Retouch Character: Whether the retouch scars were continuous or discontinuous along an edge was recorded.

3) Retouch Length: The length of retouch invading the tool surface from the tool edge was recorded. Fine retouch was deemed to be that under 2.5 mm in length whereas longer retouch was deemed "extensive".

4) Bit Width: For end scrapers, the width of the bit was recorded.

5) Bit Depth: This refers to the depth of convex retouched bit in plan view from the apex of the convexity to a line drawn joining the two ends of the retouched edge.

6) Retouched Edge/Bit Thickness: This refers to the maximum thickness of the retouched edge in profile view.

7) Retouched Edge Angle: The range of the angle in profile between the tool "underside"

and the retouched surface on the opposite face was measured using a contact goniometer. Following the lead of Odell (1979:340), an attempt was made to measure the angle at a consistent point on the retouched surface (2.5 mm from the edge) which was beyond any possible edge damage caused by use. This angle was recorded to a minimum of 5°.

Bifacial Artifacts

A number of characteristics were recorded for bifacial tools. Most of these should be self-evident. Five characteristics however, deserve additional comment.

First, flute length refers to the "length of fluting scar" of Mason (1958:14) and is the length of the flute surface from the apex of the basal concavity to its maximum extent on the point/preform surface. Second, thickness refers to maximum thickness of the biface -- not the minimum thickness as used by Callahan (1979). Third, chert banding orientation was noted on items made of Collingwood chert. The angle of the bands versus the longitudinal axis of the point was recorded as on Figure 3.2. Fourth, the "face-angle" (Wright 1981) was recorded for fluted bifaces. This angle is the one between the lateral fluted point basal edge and a line drawn at right-angles to the points longitudinal axis across its base (Figure 3.3). The face-angle was taken at each basal corner and averaged for each point if those corners were preserved. Otherwise only the measurement for the intact edge was used. Finally, "total flute surface width" or "channel width" was recorded for the bifaces. This measurement equals the width of the flute on a face if it was single fluted. However, on multiple fluted faces it refers to the combined maximum width of the fluted area as a whole.

CHAPTER 4

LITHIC RAW MATERIAL SOURCES AND PRIMARY REDUCTION

Raw Materials

With one exception (Figure 6.15h), all definite Paleo-Indian tools from the site are made on cherts. Three kinds of cherts originating in different areas of the central Great Lakes region are definitely represented in the Paleo-Indian collections: Fossil Hill (Collingwood variant), Onondaga and Bayport (Figure 1.1; Table 4-1). When original, unflaked surfaces of the raw material piece are present, they indicate the use of outcrop as opposed to secondary sources. These materials have been described in detail elsewhere (Deller and Ellis 1992b:12-13; Ellis 1984:39-52; Laye 1977; Storck and Von Bitter 1989) and will be only briefly summarized here.

The Fossil Hill chert is by far the predominantly used material. It originates in a bedded form in the Middle Silurian Fossil Hill formation (Storck and Von Bitter 1981, 1989; Eley and Von Bitter 1985; Von Bitter and Eley 1997:223-226) which extends from Manitoulin Island southeast into the Collingwood vicinity of the Ontario mainland. The Collingwood area material found at Parkhill is visually distinctive and easily separable from that of Manitoulin Island Fossil Hill deposits (Von Bitter and Eley 1997:225) and since particular geographic areas of origin are of interest in archaeological inference we will refer to this chert as "Collingwood" throughout this report. The nearest outcrops of the Collingwood chert are some 175 km northeast of Parkhill. Pieces of the chert which can be wedged out or which erode naturally from the outcrops are consistently of a blocky form and approximate a section of the chert bed. Collingwood is usually a fine-grained, opaque to somewhat transluscent, generally "hard" lustrous chert of a pale brown to beige to white colour. Generally, it has a one-way banding parallelling the chert bed orientation. However, a distinctive variety of a mottled, "soft" Collingwood chert of a dull lustre occurs in minor amounts which is usually not banded. Overall, the chert can exhibit minor quartz inclusions, restricted surface iron oxide staining and often, small dark "speckles" are present on the surface. Macro-fossils are generally absent but a few tools from Parkhill (i.e. Figure 6.18e) have adhering segments of a distinctive coral referred to as *Favosites* which is definitive of this chert type. In fact, it was the presence of this coral on specimens of the chert from till deposits in the Collingwood area which led to the discovery this chert originated in the Fossil Hill formation (Storck and Von Bitter 1981:31; Eley and Von Bitter 1989: Plate 5D; Von Bitter and Eley 1997:226). The juncture of the chert bed with the surrounding limestone matrix is quite straight, regular and abrupt on outcrop and archaeological samples.

Onondaga chert occurs primarily in a bedded form in the Clarence member of the Middle Devonian Onondaga formation (Parkins 1977). Bedrock outcrops occur along or near the modern modern northeastern Lake Erie shore in Ontario and extend eastward into New York state (Figure 1.1). The nearest outcrops to Parkhill are some 150-160 km to the southeast. This chert was also used by some of the later site occupants. However, it is relatively easy to sort out Paleo-Indian materials because they have been highly weathered.

Table 4.1: Distribution of Parkhill Artifact Types by Raw Materials.*

Type	Collingwood (Fossil Hill)	Onondaga	Bayport	Unknown	Total
Points	92 [86.8%]	3 [2.8%]	9 [8.5%]	2 [1.8%]	106
Preforms	13 [86.7%]	1 [6.7%]	1 [6.7%]	-	15
Other Fluted Bifaces	10 (90.9%)	1(2) (9.0%)	-	-	11(12)
Unfluted Preforms	5 [100%]	-	-	-	5
Channel Flake Points	6 [100%]	-	-	-	6
Large Alternately Bevelled Bifaces	2 [66.6%]	1 [33.3%]	-	-	3
Small Alternately Bevelled Bifaces	2 [100%]	-	-	-	2
Backed Bifaces	2 [100%]	-	-	-	2
Marginally Retouched Bifaces	3 [100%]	-	-	-	3
Biface Fragments	3 [75.0%]	1 [25.0%]	-	-	4
Trianguloid End Scrapers	19(24) [86.3%]	2(5) [9.2%]	1(2) [4.5%]	-	22(31)
Large Parallel-Sided End Scrapers	3(4) [37.5%]	1(2) [12.5%]	3 [37.5%]	1 [12.5%]	8(10)
Laterally Notched End Scrapers	2 [66.6%]	1 [33.3%]	-	-	3
Fluted End Scrapers	2 [100%]	-	-	-	2
Bi-Bitted End Scrapers	2 [66.6%]	1 [33.3%]	-	-	3

Table 4.1 (continued).

Type	Collingwood (Fossil Hill)	Onondaga	Bayport	Unknown	Total
Narrow End Scrapers	8 [88.8%]	1 [11.1%]	-	-	9
Offset End Scrapers	2(3) [100%]	-	-	-	2(3)
Other End Scrapers	5 [100%]	-	-	-	5
Simple Beak	2 [50.0%]	2 [50.0]	-	-	4
Hafted Perforator	2 [100%]	-	-	-	2
Piercers or Gravers	11 [68.7%]	3 [18.7%]	2 [12.5%]	-	16
Denticulate	4 [100%]	-	-	-	4
Notch/Borer/ Denticulate	5 [83.3%]	1 [16.6%]	-	-	6
Concave Side Scrapers with Spurs	2(3) [66.6%]	-	1 [33.3%]	-	3(4)
Other Side Scrapers	12(13) [92.3%]	-	1 [7.7%]	-	13(14)
Retouched Flakes	19 [95.0%]	1 [5.0%]	-	-	20
Other Unifaces & Fragments	47 [92.2%]	-	3 [5.9%]	1 [2.0%]	51
Totals	285 [86.4%]	20 [6.1%]	21 [6.4%]	4 [1.2%]	330

*numbers in round brackets indicate totals including items recycled into other uses.

Onondaga is a mottled, fine grained chert which ranges from a dark blue-grey to light grey in colour. It is of a medium lustre, is opaque and can exhibit quartz-filled concavities, minor brown limestone inclusions and surface iron oxides. Junctures of the chert bed with the surrounding limestone matrix are generally irregular and can be emphasized on archaeological samples from acidic soils by erosion of the limestone.

Bayport chert occurs in the Upper Mississippian Bayport formation of the Saginaw Bay area of Michigan, some 120-150 km northwest of Parkhill (Figure 1.1; see Dustin 1935; Luedtke 1976). It can occur in a bedded form but a nodular form appears to be more common. The few tools in the Parkhill sample with original surfaces adhering are from nodular sources. The chert is of a light grey to brownish grey to dark greenish grey in colour. It is opaque with a dull lustre, is somewhat coarse to medium in texture and has small quartz crystal grain inclusions. Occasionally, iron oxides are present on small surface areas. The chert tends to be more fossiliferous than those previously described. A distinctive characteristic of the chert is a concentric banding which originates at the centre of nodules and is not found on any southern Ontario cherts. Junctures with the surrounding limestone matrix range from gradual to very abrupt. Bayport chert also weathers more easily than other cherts from the central Great Lakes area and a "chocolate brown" patina is often present and particularly on older items (e.g. Luedtke 1976:200; Voss 1977). Paleo-Indian items on Bayport, including those at Parkhill, often stand out because of this weathering. Indeed, the weathering is so distinctive that it has allowed the initial recognition of Paleo-Indian sites in surface collection prior to actually recovering any diagnostic tools (Deller and Ellis 1998, 1999).

In addition to the above, some items on Kettle Point chert (Figures 1.1, 1.2; Janusas 1984), the metasediment sub-greywacke (see Kenyon 1980a), quartz, slate and granitic rock were also recovered from the most extensively excavated site areas. The lack of Paleo-Indian diagnostics on those materials, evidence of extensive use of such materials by later site occupants and contextual and distributional data to be reviewed in Section III, suggests the vast majority of this material is not associated with the Paleo-Indian occupation of the site. Possible exceptions are some Kettle Point and sub-greywacke waste, as well as a used flake, from Area C (see Chapter 9) and three probable tools on other non-siliceous materials from Areas B and D. Yet, these associations are uncertain and so this material is not included in the totals in the following analyses. This material is however, described in the appropriate section (Chapters 6 and 9). Even if it is Paleo-Indian associated, the small amount of material represented (77 generally small pieces of debris and four, largely expedient tools) suggests little bias is introduced by excluding it from the totals.

Kettle Point chert is a fine-grained, often banded, chert with a waxy lustre which ranges considerably in colour from a reddish brown to bluish grey to black (Eley and Von Bitter 1989:15; Janusas 1984:2-5). The chert occurs at the juncture of the Upper Devonian Kettle Point Formation and the Middle Devonian Hamilton Formation of the Ipperwash group. In theory the chert could occur at the juncture of these two formations found underlying most of southwestern Ontario (e.g. Janusas 1984:3). However, it is usually buried under tens of metres of glacial and lake deposits throughout the whole area excepting the northernmost part where there are some limited bedrock exposures at the surface. The only known natural outcrops occur on the shore of Lake Huron some 25 km to the northwest of the Parkhill site. There are reports (Janusas 1984:3) of the chert near a railway cut through a linear bedrock formation which crops out naturally near, in fact 750

Table 4.2: Blank Length.*

BLANK TYPE	N	RANGE	MEAN	S.D.
Primary Top-Corner	0	-	-	-
Secondary Top-Corner	0	-	-	-
Primary Top-Face	1	-	49.2	-
Tertiary Top-Face	0	-	-	-
Primary Side-Corner	1	-	54.4	-
Secondary Side-Corner	1	-	25.0	-
Primary Side-Face	1	-	37.6	-
Secondary Side-Face	4	30.1-55.6	46.03	11.659
Tertiary Side-Face	2	29.6-48.1	38.85	-
Normal Biface Core Flake	4	32.7-54.1	44.13	9.595
End Biface Core Flake	2	41.2-100.5	70.85	-

*: N= # of specimens; S.D.=standard deviation; measurements in mm.

metres to the west of, the Thedford II Paleo-Indian site (Deller and Ellis 1992b:2; see Figure 1.2). However, that formation was thoroughly examined in conjunction with the Thedford II investigations and no evidence was found of any chert deposits. In fact, the exposed bedrock here consists solely of the older Hamilton formation and the juncture with the overlying Kettle Point formation where the chert occurs is well to the west of that area (at least 10 km) where it is deeply buried under glacial deposits (such as the St. Joseph till and pro-glacial Lake Warren deposits discussed in Chapter 2) which much pre-date the Paleo-Indian occupation of the area (e.g. >12,500 B.P.). It is extremely unlikely there are any primary deposits of this chert above the level of modern Lake Huron other than the ones currently known at the modern shore despite claims to the contrary (Storck 1997:252). Also, and as discussed in Chapter 2, since the water levels in the Huron basin were definitely above the modern level around the time of the Early Paleo-Indian occupation, the only credible bedrock deposits of this chert at Kettle Point itself were under water and not available for exploitation.

Of course, the inaccessibility of primary deposits does not rule out the possibility secondary deposits could be used and these secondary deposits occur throughout the area including the immediate Parkhill site vicinity. In this regard, it is notable that unlike the previously described chert types, the small number of potential Paleo-Indian items on Kettle Point chert at Parkhill, and particularly the best candidates for use by Paleo-Indians, often have weathered surfaces indicating they were obtained from secondary deposits (see Chapter 9 below). In fact, pieces of the chert in secondary deposits are common in the area.

Primary Reduction

With the possible exception of some minimal use of local Kettle Point chert, there is no evidence that core reduction and tool blank production occurred at the Parkhill site. As on other Parkhill industry sites in the area, all of the

Table 4.3: Blank Width.

BLANK TYPE	N	RANGE	MEAN	S.D.
Primary Top-Corner	1	-	12.70	-
Secondary Top-Corner	2	21.8-22.3	22.05	-
Primary Top-Face	2	24.0-40.1	32.05	-
Tertiary Top-Face	3	16.6-34.4	26.20	-
Primary Side-Corner	2	26.6-33.2	29.90	-
Secondary Side-Corner	6	14.5-37.7	26.75	8.366
Primary Side-Face	2	25.7-54.9	40.30	-
Secondary Side-Face	5	28.3-49.8	39.22	8.422
Tertiary Side-Face	9	20.9-47.6	32.18	8.252
Normal Biface Core Flake	14	20.7-40.9	28.79	5.259
End Biface Core Flake	2	27.3-47.2	37.25	-

flaking debris from the site is quite small (see below) and represents only the later stages of tool manufacture and the rejuvenation of tool edges. Thus, one is forced to rely on the flakes made into or used as tools in order to infer the earlier stages of tool manufacture. With a few exceptions to be noted below, detailed analyses of the Parkhill blanks generally supports the model of core reduction suggested elsewhere for the Parkhill industry at the Thedford II site (Deller and Ellis 1992b:13-24; Ellis 1984:61-130). Therefore, only a brief summary is provided here. In the following, the focus is on tools made on Collingwood chert since these predominate in the assemblage. Blanks on other materials are considered only where they are the product of the reduction of highly distinctive core forms such as bifacial ones.

As noted above, all Collingwood chert occurs in a bedded form and pieces which can be obtained from outcrops are primarily blocky forms which approximate a section of the chert bed. Therefore, it is not surprising that the evidence indicates the knappers always began with a "quarry block" of this nature. These blocks probably varied considerably in terms of size and outline form if modern outcrop samples are any guide. For purposes of simplification, the blocks are illustrated as squarish to rectangular forms with six faces on the accompanying illustrations (Figures 4.1 and 4.2). Another important feature of the chert is the one-way banding. By noting the orientation of banding on derived flakes, supplemented by other information such as cortical placement, it is possible to place almost every derived flake back into its original relative orientation or position *vis à vis* the quarry block from which they were derived. The result is that quite detailed reduction sequence models can be constructed.

The quarry blocks were reduced in a systematic manner to produce tool blanks. This reduction trajectory is indicated by the consistent use of two kinds of surfaces as striking platforms, each of which serves to define a general category of blank form. The consistent use of these two kinds of surfaces as platforms for flake removal is indicated by patterning in how the bands of the chert are

Table 4.4: Blank Thickness.

BLANK TYPE	N	RANGE	MEAN	S.D.
Primary Top-Corner	2	6.5-10.3	8.40	-
Secondary Top-Corner	4	6.1-16.0	10.53	4.644
Primary Top-Face	2	7.2-13.0	10.10	-
Tertiary Top-Face	3	4.3-7.1	5.60	-
Primary Side-Corner	2	8.7-9.3	9.00	-
Secondary Side-Corner	8	4.6-13.2	9.58	3.203
Primary Side-Face	2	5.8-14.8	10.30	-
Secondary Side-Face	8	3.0-15.0	11.00	4.062
Tertiary Side-Face	12	3.7-9.4	6.89	1.852
Normal Biface Core Flake	16	4.9-10.1	6.57	1.565
End Biface Core Flake	2	4.6-7.2	5.90	-

oriented with regard to the longitudinal axis of the derived flakes. These surfaces are referred to as "tops" and "sides". For convenience, tops and sides are illustrated on the accompanying figures as they would appear on an original quarry block (e.g. Figure 4.1A). However, it must be emphasized that the terms are applied to any flake with the requisite banding regardless of whether they represent initial removals from the blocks or blanks produced later in the reduction sequence. Tops are any surface which parallels the surface of the banding planes in the chert. In terms of the original chert bed, these surfaces approximate in orientation the junctures of that chert bed with the surrounding limestone matrix so they can be, but need not be, cortical. If we were to take a quarry block and use a top as a striking platform, the edges of the banding planes would appear at right-angles in plan (ca. 0-10° in the method of measurement) to the longitudinal axis on the derived flake (e.g. Figures 4.1B-C, D-E, F-G, H-I). It should be re-emphasized that any flake with this banding orientation, regardless of whether it is an initial removal from a quarry block, is classified as "top-removed" on the basis of such banding.

The term side is applied to any face which is at right-angles to the banding plane surfaces and by extension, to top surfaces. In terms of the original chert bed, these surfaces approximate in orientation the exposed part of the chert bed which would be visible when encased in a surrounding bedrock matrix (see Figure 4.1A). If we were to take a quarry block and use a side as a striking platform to remove flakes from other sides of the block, the bands on the derived flakes would appear as generally parallelling the longitudinal flake axis (e.g. Figure 4.2A-B, C-D, etc.; ca. 80-90° in the method of measurement) in contrast to the use of tops as striking platforms where the bands appear at right-angles to this axis. Another contrast between top- and side-derived flakes is that when cortex is present on the side-removed flakes, it never appears on the platform but instead, it is restricted to a small area along a lateral blank edge if the flake was removed near a corner of the original block as on, for example, Figure 4.2C-D.

Theoretically, it is possible to remove flakes primarily across the top of a block using

Table 4.5: Blank Weight.

BLANK TYPE	N	RANGE	MEAN	S.D.
Primary Top-Corner	0	-	-	-
Secondary Top-Corner	0	-	-	-
Primary Top-Face	1	-	30.0	-
Tertiary Top-Face	0	-	-	-
Primary Side-Corner	1	-	12.22	-
Secondary Side-Corner	1	-	16.90	-
Primary Side-Face	1	-	15.21	-
Secondary Side-Face	4	3.04-39.79	23.39	15.182
Tertiary Side-Face	2	2.98-13.64	8.31	-
Normal Biface Core Flake	3	5.75-14.06	8.52	-
End Biface Core Flake	0	-	-	-

a side as a striking platform, a process which would result in flakes with circular to curved "marbled" banding in flake plan view rather than straight bands parallelling one another (see Deller and Ellis 1992b: Figures 8B and 10). However, as at the Thedford II site (Deller and Ellis 1992b:13), such marbled banding is rare to non-existent at Parkhill (N=1) indicating the body of flakes were consistently removed only from surfaces approximating sides even though platforms used to detach such flakes could be either tops or sides of the block.

Analyses suggest that two systematic reduction procedures of quarry blocks were carried out by Parkhill industry knappers. In one sequence, top-removed flakes with banding edges at right-angles to the longitudinal flake axis were the primary products whereas in the other, side-removed flakes with longitudinal banding were produced (see Table 4.13). Eleven blank types of a consistent form were produced by knappers which are significant in terms of various stages in the reduction of the blocks in these sequences. There is also the suggestion that certain of these types were consistently selected, and hence, probably produced, to serve as blanks for specific tool forms such as fluted points, trianguloid end scrapers, assymetrical or offset end scrapers and backed and snapped unifaces (see below and Ellis 1984, 1993). Characteristics of the various types of blanks are presented on Tables 4.2 to 4.21. As well, a decision model showing how the primary means by which the various blanks types are defined or isolated is presented on Figure 4.3 which should aid in the following discussions.

Reduction Sequence I

The first reduction sequence began with the quarry block and, as implied above, the block was consistently reduced throughout the sequence using a surface approximating a top as a striking platform (Figure 4.1). Hence all blanks produced in this sequence exhibit the chert bands at right-angles to the flake's longitudinal axis in plan view and cortical platforms can occur unless the platform has been highly prepared. Another characteristic of the flakes produced in this sequence is that the

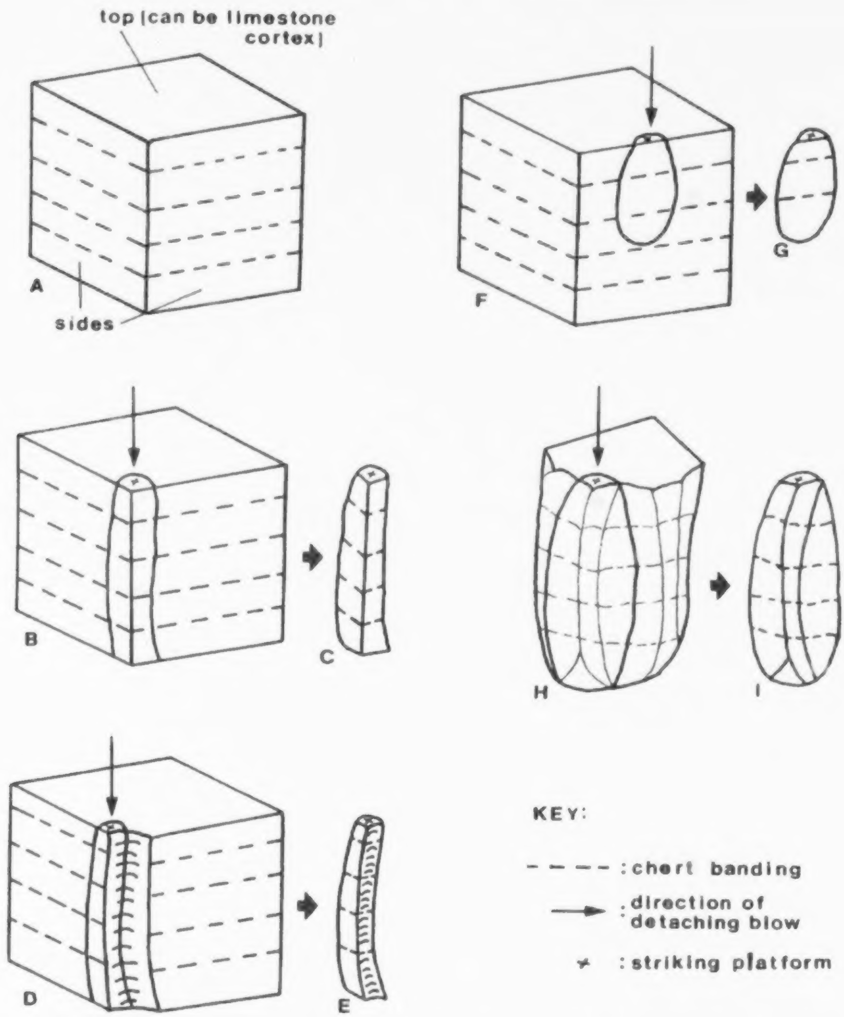
top (can be limestone cortex)
A
sides
F
G
B
C
H
I
D
E
KEY:
: chert banding
: direction of detaching blow
: striking platform

Figure 4.1: Schematic illustration of Collingwood chert quarry block and derivation of flake blanks characteristic of reduction sequence I. A: quarry block approximating section of chert bed showing distinction between top and side surfaces; B-C: detachment of primary top-corner flake blank from unflaked quarry block and resulting flake morphology; D-E: detachment of secondary top-corner flake blank from quarry block and resulting flake morphology; F-G: detachment of primary top-face blank from unflaked quarry block surface and resulting flake morphology; H-I: detachment of tertiary top-face blank (in this case a "blade-flake") from surface of roughly conical core and resulting flake morphology. Note banding at right-angles to longitudinal axis on all derived flakes showing all were removed using surface approximating a "top" as a striking platform surface.

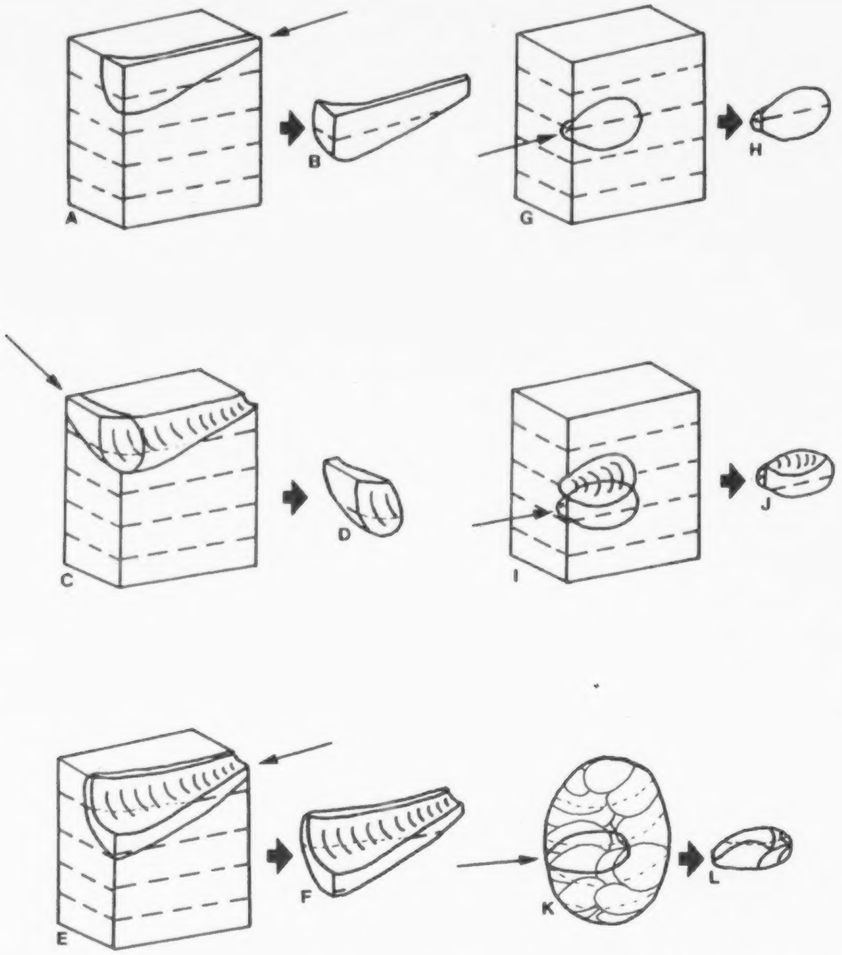

Figure 4.2: Schematic illustration of Collingwood chert quarry block and derivation of flake blanks characteristic of reduction sequence II. For key see Figure 4.1. A-B: detachment of primary side-corner flake blank from unflaked quarry block and resulting flake morphology; C-D: detachment of primary side-corner blank from opposite corner of quarry block and resulting flake morphology; E-F: detachment of secondary side-corner blank from quarry block and resulting flake morphology; G-H: detachment of primary side-face blank from unflaked surface of quarry block and resulting flake morphology; I-J: detachment of secondary side-face blank and resulting flake morphology with partial unflaked dorsal surface; K-L: large ovate biface core and banding orientation on core and resulting flake blanks. Note that surfaces approximating in orientation the sides of the original block were always employed such that resulting flakes tend to have banding generally paralleling the detached blanks' longitudinal axis.

Table 4.6: Core Facet Angle by Blank Type.

BLANK TYPE	N	RANGE	MEAN	S.D.
Primary Top-Corner	2	-	92.5	-
Secondary Top-Corner	3	92.5-112.5	102.5	-
Primary Top-Face	0	-	-	-
Tertiary Top-Face	3	132.5-142.5	137.5	-
Primary Side-Corner	3	90.0-95.0	92.50	-
Secondary Side-Corner	8	107.5-117.5	112.18	3.882
Primary Side-Face	0	-	-	-
Secondary Side-Face	3	117.5-137.5	125.83	-
Tertiary Side-Face	6	142.5-157.5	149.17	6.055
Normal Biface Core Flake	10	122.5-152.5	143.00	10.395
End Biface Core Flake	0	-	-	-

same platform seems to have been used for all blank removals from the same block. On flakes possessing dorsal scars, these scars all originate at the platform end of the blank under examination. In sum, the flakes suggest the cores were always worked unidirectionally and as a result, flakes have low flake scar counts (Table 4.12). A third overall characteristic is curvature. Excepting some flakes which have pronounced distal curvature (i.e. they appear "hook-shaped" in longitudinal section), these flakes exhibit relatively little curvature (Table 4.8). In this sequence, and the second one to be detailed below, a distinction is made between three kinds of blanks: primary or normal, secondary and tertiary. Primary flakes are ones exhibiting completely unflaked dorsal surfaces and they represent the initial removals from a quarry block. Secondary flakes have only partially unflaked dorsal surfaces and represent early, but not the first, removals from an area of the quarry block. Tertiary flakes have completely flaked dorsal surfaces and represent later stages of block reduction.

Primary Blanks

As at Thedford II (Deller and Ellis 1992b:16), an easily recognized, although rare, form of primary blank removals are of the type referred to as primary or normal top-corner blanks. These flakes are struck off an original corner of the quarry block (Figure 4.1B-C). They tend to be straight in longitudinal profile but they can exhibit a pronounced distal curvature where the flake curved through the bottom of the core. They are triangular in transverse section exhibiting a medial ridge separating two major dorsal facets. The juncture of these two facets (i.e. the medial ridge) is abrupt (core facet angle of ca. 90°; see Table 4.6) and is the old corner of the block (Figure 4.1C).

One would generally expect corners to be favoured for initial removals since it is difficult to remove substantial flakes from flat surfaces away from corners where there are no ridges. At Thedford II, the absence of initial removals from flat faces was seen to be a product of this difficulty (Ellis 1984:121). However, at Parkhill there are some primary removals which were not from corners (removed

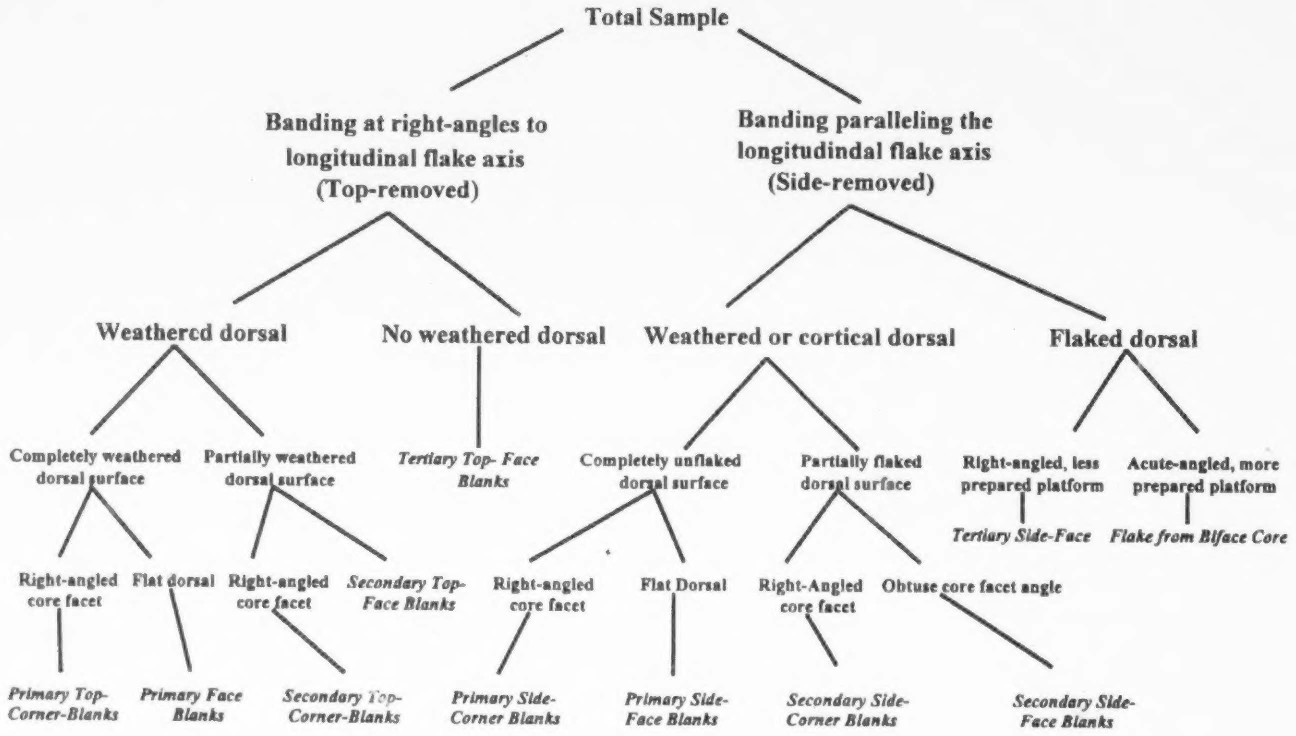
Total Sample
Banding at right-angles to longitudinal flake axis (Top-removed)
Banding paralleling the longitudindal flake axis (Side-removed)
Weatherd dorsal
No weathered dorsal
Weathered or cortical dorsal
Flaked dorsal
Completely weathered dorsal surface
Partially weathered dorsal surface
Tertiary Top- Face Blanks
Completely unflaked dorsal surface
Partially flaked dorsal surface
Right-angled, less prepared platform
Acute-angled, more prepared platform
Tertiary Side-Face
Flake from Biface Core
Right-angled core facet
Flat dorsal
Right-angled core facet
Secondary Top-Face Blanks
Right-angled core facet
Flat Dorsal
Right-Angled core facet
Obtuse core facet angle
Primary Top-Corner-Blanks
Primary Face Blanks
Secondary Top-Corner-Blanks
Primary Side-Corner Blanks
Primary Side-Face Blanks
Secondary Side-Corner Blanks
Secondary Side-Face Blanks

Figure 4.3: Decision tree model for sorting Collingwood chert blanks into types.

Table 4.7: Lateral Expansion by Blank Type.

BLANK TYPE	N	RANGE	MEAN	S.D.
Primary Top-Corner	1	-	32.5	-
Secondary Top Corner	2	17.5-27.5	22.5	-
Primary Top-Face	0	-	-	-
Tertiary Top-Face	1	-	27.5	-
Primary Side-Corner	2	27.5-52.5	40.0	-
Secondary Side-Corner	3	37.5-47.5	40.83	-
Primary Side-Face	1	-	72.5	-
Secondary Side- Face	2	52.5-57.5	55.0	-
Tertiary Side-Face	1	-	32.5	-
Normal Biface Core Flake	11	27.5-62.5	48.86	11.638
End Biface Core Flake	0	-	-	-

Table 4.8: Curvature by Blank Type.

BLANK TYPE	N	RANGE	MEAN	S.D.
Primary Top-Corner	2	4-15	9.50	-
Secondary Top Corner	3	10-12	10.67	-
Primary Top-Face	2	10-15	12.50	-
Tertiary Top-Face	4	6-15	11.00	4.69
Primary Side-Corner	2	5-10	7.50	-
Secondary Side-Corner	7	3-15	9.00	4.73
Primary Side-Face	2	10-15	12.5	-
Secondary Side-Face	8	8-15	12.38	3.16
Tertiary Side-Face	12	8-15	10.75	1.82
Normal Biface Core Flake	15	5-13	9.33	2.29
End Biface Core Flake	2	10-14	12.00	-

as on Figure 4.1F-G). They are referred to here as primary top-face blanks. They have flat, unflaked weathered dorsal surfaces with essentially a core facet angle of 180° (e.g. no core facet angle). Since it requires considerable force to remove flakes from flat surfaces, these blanks tend to be short and to hinge terminate. As well, they tend to have quite convex ventral surfaces with pronounced bulbs (Table 4.14). The overall result is that these flakes have a transverse section which is the reverse of that found on most flakes produced elsewhere in the sequence of reduction; that is, convex-plano as opposed to a norm of plano-convex (see Figure 3.4b). Therefore, when used as blanks for unifacial tools, the retouch usually appears on the ventral surface in contrast to the normal, dorsal retouch found on most other blanks (e.g. Figure 6.18f). It is unclear how these primary blank removals from flat faces fit into the overall core and reduction sequence other than the fact, of course, that they represent initial removals from some flat areas of the quarry blocks.

Table 4.9: Platform Angle by Blank Type.

BLANK TYPE	N	RANGE	MEAN	S.D.
Primary Top-Corner	0	-	-	-
Secondary Top-Corner	1	-	82.5	-
Primary Top-Face	0	-	-	-
Tertiary Top-Face	2	67.5-77.5	72.5	-
Primary Side-Corner	2	77.5-82.5	80.0	-
Secondary Side-Corner	3	67.5-77.5	74.17	-
Primary Side-Face	1	-	87.5	-
Secondary Side-Face	5	67.5-87.5	73.5	8.216
Tertiary Side-Face	5	72.5-87.5	79.5	5.701
Normal Biface Core Flake	12	37.5-67.5	49.58	8.649
End Biface Core Flake	2	47.5-62.5	55.0	-

Table 4.10: Platform Length by Blank Type.

BLANK TYPE	N	RANGE	MEAN	S.D.
Primary Top-Corner	0	-	-	-
Secondary Top-Corner	1	-	7.10	-
Primary Top-Face	0	-	-	-
Tertiary Top-Face	2	6.4-13.6	10.00	-
Primary Side-Corner	1	-	11.50	-
Secondary Side-Corner	3	6.5-10.0	8.53	-
Primary Side-Face	1	-	12.8	-
Secondary Side-Face	5	12.0-33.7	20.56	8.938
Tertiary Side-Face	4	4.7-14.5	9.73	5.352
Normal Biface Core Flake	12	5.6-14.1	8.74	2.538
End Biface Core Flake	1	-	17.4	-

Secondary Blanks

After the initial removals, reduction was continued which removed all remaining evidence of the unflaked block surfaces. This produced blanks with only partially flaked dorsal surfaces. Only one type of blank in the Parkhill collections represents this stage of reduction: secondary top-corner blanks. As the type name implies, these blanks are produced by the continued removal of flakes from near the original corner of the quarry block (Figure 4.1D-E). As such, they are quite similar to the primary flakes from corners, having a major dorsal ridge with a core facet angle closer to 90°. The only real difference is that one of the two dorsal facets is a flaked, rather than unflaked, surface (see Figure 4.1D-E). Theoretically, one might expect another form of secondary blank which represents continued removals from partially flaked flatter faces of the core after major corners had been removed. None of these secondary top-face blanks occur at Parkhill. However, they do occur in other Parkhill industry collections and have the unflaked surfaces along a lateral edge or, in a few cases, at the distal end (i.e. Figure 5.13a).

Tertiary Blanks

There is only one blank type which represents continued removal of blanks from the core after all original unflaked surfaces and abrupt corners had been removed: tertiary top-face blanks. This type simply encompasses all remaining blanks with right-angled banding (Table 4.13). They uniformly have flat cross-sections with high core facet angles (Table 4.6) and relatively obtuse platform angles. A notable variety of these blanks, which consistently occurs as unifacial tools on Parkhill industry sites, is a large more linear detachment approximating a "blade-flake" in Callahan's (1979) terms. Comparable morphological items occur in the Parkhill collections on Bayport chert (e.g. Figure 6.11a) as well as Collingwood. These, as well as some of the secondary top-face blanks (i.e. Figures 5.16a), are the only kinds of blanks which exhibit a combination of attributes suitable for manufacture

Table 4.11: Platform Width by Blank Type.

BLANK TYPE	N	RANGE	MEAN	S.D.
Primary Top-Corner	0	-	-	-
Secondary Top-Corner	1	-	5.3	-
Primary Top-Face	0	-	-	-
Tertiary Top-Face	2	3.5-5.1	4.3	-
Primary Side-Corner	2	3.4-5.2	4.3	-
Secondary Side-Corner	3	2.4-4.1	3.30	-
Primary Side-Face	1	-	4.4	-
Secondary Side-Face	5	2.3-12.1	7.60	4.177
Tertiary Side-Face	4	2.2-6.6	4.63	2.043
Normal Biface Core Flake	12	1.8-3.7	2.70	0.583
End Biface Core Flake	2	2.0-8.1	5.05	-

Table 4.12: Number of Dorsal Scars by Blank Type.

BLANK TYPE	N	RANGE	MEAN	S.D.
Primary Top-Corner	2	-	0	-
Secondary Top Corner	4	1-2	1.25	0.50
Primary Top-Face	2	-	0	-
Tertiary Top-Face	4	1-3	2.25	0.96
Primary Side-Corner	3	0-4	1.67	-
Secondary Side-Corner	8	1-4	2.00	1.07
Primary Side-Face	2	-	0	-
Secondary Side-Face	5	2-3	2.60	0.55
Tertiary Side-Face	8	1-4	2.63	1.19
Normal Biface Core Flake	14	4-6	4.43	0.65
End Biface Core Flake	2	4-5	4.50	-

Table 4.13: Collingwood Banding Orientation by Blank Type.

Blank Type	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Primary Top-Corner	2	-	-	-	-	-	-	-	-
Secondary Top-Corner	4	-	-	-	-	-	-	-	-
Primary Top-Face	2	-	-	-	-	-	-	-	-
Tertiary Top-Face	3	-	1	-	-	-	-	-	-
Primary Side-Corner	-	-	-	-	-	-	-	-	2
Secondary Side-Corner	-	-	-	-	-	-	-	1	7
Primary Side-Face	-	-	-	-	-	-	-	-	2
Secondary Side-Face	-	-	-	-	-	-	-	2	6
Tertiary Side-Face	-	-	-	-	-	-	1	1	11
Normal Biface Core Flake	-	-	1	-	-	-	4	5	3
End Biface Core Flake	1	1	-	-	-	-	-	-	-
Unassignable	4	1	-	-	-	-	1	1	2

into fluted bifaces, namely size and a lack of curvature. Moreover, as will be detailed below, the Collingwood items exhibit the same banding (at right-angles to the longitudinal axis) as most of the points. Hence, it seems a certainty that it was these large top-face blanks which were primarily produced and used as blanks for points. It has been suggested that the larger tertiary top-face blanks indicate the use of large unidirectional block cores (as on Figure 4.1H-I) which Callahan (1979) has found very suitable to produce blanks for points. In this scheme, smaller top-face blanks are seen to represent trimming of the block cores or the product of removals from highly reduced, largely exhausted cores of this nature.

Reduction Sequence II

The second suggested sequence of quarry block reduction is somewhat more complex than the first. Besides complexity, there are several other contrasts with Reduction Sequence I. First, the blanks produced have banding which tends to follow or be most closely oriented towards the longitudinal axis of

Table 4.14: Bulb Type by Blank Type.

Blank Type	Diffuse/Absent	Moderate	Pronounced
Primary Top-Corner	-	-	-
Secondary Top Corner	-	2	-
Primary Top-Face	-	-	1
Tertiary Top-Face	-	2	-
Primary Side-Corner	-	1	1
Secondary Side-Corner	2	2	
Primary Side-Face	-	-	1
Secondary Side-Face	-	3	2
Tertiary Side-Face		2	3
Normal Biface Core Flake	11	4	-
End Biface Core Flake	2	-	-
Totals	15	16	8

the flake (i.e. over ca. 60° in the method of measurement). In sum, platforms approximating or close to sides in orientation were continually used as striking platforms to detach these flake blanks. There is one blank type though which is an exception to this rule (end flakes from biface cores) as will be discussed below. Second, the flakes in Reduction Sequence II for the most part exhibit relatively pronounced and more symmetrical longitudinal curvature (Tables 4.8 and 4.20). Third, dorsal scars are frequently bidirectional on blanks (Table 4.19). This characteristic indicates that not only was a platform used to derive the flake under examination employed for reduction but also, a platform at the opposite end of the core. Hence, excluding most of the primary flakes, these blanks tend to have large dorsal flake scar counts. Finally, the goal of Reduction Sequence I was to form a unidirectional block core suitable to produce blanks primarily made into large side scrapers and for biface preforms, whereas in Reduction Sequence II, I suggest the quarry block was reduced to a large ovate biface core with recognizable lateral edges (i.e. the biface cores were not circular). These large bifaces were in turn used to produce flakes suitable for a wide range of unifacial tools. Since the final desired product of this sequence was a biface core, it is possible the quarry blocks initially selected were relatively thin as it is difficult to work thicker blocks into bifaces. Therefore, thinner blocks are used to illustrate this sequence of reduction on the accompanying Figure 4.2.

Primary Blanks

Two kinds of primary blanks were produced in Reduction Sequence II which are analogous to the Sequence I primary blanks: namely, those from corners and from flat faces of the quarry block. Those from corners (detached as on Figure 4.2A-B, C-D) are

Table 4.15: Cortex by Blank Type.

Blank Type	Left Lateral	Right Lateral	Other Cortex	Absent
Primary Top-Corner	-	-	-	2
Secondary Top Corner	-	-	-	4
Primary Top-Face	-	-	1	1
Tertiary Top-Face	-	-	-	4
Primary Side-Corner	1	1	-	1
Secondary Side-Corner	5	1	-	2
Primary Side-Face	-	-	-	2
Secondary Side-Face	-	-	-	7
Tertiary Side-Face	-	-	-	13
Normal Biface Core Flake	-	-	-	16
End Biface Core Flake	-	-	-	2
Totals	6	2	1	54

referred to as primary or normal side-corner blanks. As with the primary top-corner blanks, they have a single pronounced dorsal ridge separating two dorsal facets which represent respectively, the juncture and two adjacent faces of an original block.

These items differ from the primary top-corner flakes in certain respects beyond banding orientation. First, since one of the adjoining faces at a corner can be cortical, one of the dorsal facets is usually of this nature (Table 4.15). Second, the ridge representing the old corner of the block is not well-centered. Rather it is almost always (one exception known from the Thedford II site which may be an error in reduction) markedly offset towards one lateral edge making one of the two dorsal facets quite narrow. Always, this narrow facet is the cortical one or that facet representing the old top surface of the block. As a result of this offset ridge, these blanks have a wedge-shaped transverse section rather than a triangular one (Table 4.17). An exception is a single specimen (Figure 6.18g) removed somewhat down the face from the corner, the detachment of which just touched the cortical corner. Since that item was detached primarily from a flat unflaked surface, it has a more plano-convex transverse cross-section (e.g. a flat dorsal and a convex underside; Table 4.17). Finally, although these blanks lack dorsal scars originating at the same platform, they can (N=2) exhibit distal scars representing previous removals from a platform directly opposite that used for the flake's detachment. In other words, and as is the case for the majority of removals produced in this reduction sequence, they can be from bidirectionally worked cores. For example, the primary side-corner flake shown on Figure

Table 4.16: Weathered Surface by Blank Type.

Blank Type	"All-Over"	Left Lateral	Right Lateral	Other Placement	Absent
Primary Top-Corner	1	-	-	1	-
Secondary Top Corner	-	2	1	1	-
Primary Top-Face	1	-	-	1	-
Tertiary Top-Face	-	-	-	-	4
Primary Side-Corner	-	1	-	2	-
Secondary Side-Corner	-	-	5	-	3
Primary Side-Face	2	-	-	-	-
Secondary Side-Face	-	1	2	4	1
Tertiary Side-Face	-	-	-	-	13
Normal Biface Core Flake	-	-	-	-	16
End Biface Core Flake	-	-	-	-	2
Totals	4	4	8	9	39

6.19c has four scars at the distal end representing removals from an opposite platform. These scars almost certainly represent previous removals of primary (and perhaps secondary; see below) side-corner flakes using another opposing corner as a striking platform (as on Figures 4.2A-B to C-D). Primary side-face blanks (detached as on Figure 4.2G-H) are analogous to primary top-face blanks except for having longitudinal instead of right-angled banding edges visible in plan. Moreover, because they were removed from flat surfaces, they tend to have convex-plano transverse sections and, when made into tools are often edge retouched on the ventral, convex, face (e.g. Figure 6.18c).

Table 4.17: Transverse Section by Blank Type.

Blank Type	Triangular	Offset Triangular	Trapezoidal	Plano-Convex	Convex-Plano	Wedge	Other
Primary Top-Corner	2	-	-	-	-	-	-
Secondary Top Corner	1	2	1	-	-	-	-
Primary Top-Face	-	-	-	-	1	-	-
Tertiary Top-Face	2	1	-	-	-	-	1
Primary Side-Corner	-	-	-	-	1	2	-
Secondary Side-Corner	-	5	1	-	-	2	-
Primary Side-Face	-	-	-	-	1	-	-
Secondary Side- Face	1	2	-	2	1	-	1
Tertiary Side-Face	4	3	-	2	1	-	1
Normal Biface Core Flake	8	3	-	5	-	-	-
End Biface Core Flake	-	-	-	2	-	-	-
Totals	18	16	2	11	5	4	3

Secondary Blanks

Secondary side-corner blanks, like primary blanks of that nature, usually have a single dorsal ridge separating two dorsal facets, one of which is cortical. Moreover, the ridge and cortex facet is offset towards one lateral edge. The major difference is that the non-cortical dorsal facet is flaked rather than being an unflaked surface (Figure 4.2E-F). As well, transverse sections differ with an offset triangular as opposed to wedge-shaped cross-section and tend to have a higher, more obtuse, core-facet angles (Table 4.6).

Table 4.18: Lateral Edge Orientation by Blank Type.

Blank Type	Expanding	Parallel	Contracting
Primary Top-Corner	1	1	-
Secondary Top Corner	4	-	-
Primary Top-Face	1	1	-
Tertiary Top-Face	2	-	-
Primary Side-Corner	3	-	-
Secondary Side-Corner	7	1	-
Primary Side-Face	1	-	-
Secondary Side-Face	4	-	1
Tertiary Side-Face	10	-	-
Normal Biface Core Flake	16	-	-
End Biface Core Flake	2	-	-
Totals	51	3	1

Secondary side-face blanks represent continued removals from flatter faces instead of corners of the original quarry block. Unlike the secondary side-corner blanks, they lack a pronounced ridge and cortex representing an area near the block's original corner. By definition, they are distinguished by the presence of an unflaked weathered dorsal facet. The flaked facet could represent the previous removal of a primary or secondary side-corner flake or could have been produced by a previous primary side-face blank removal (as on the sequence from 4.2G-H to 4.2I-J).

Tertiary Blanks

The first of the tertiary removals are referred to as tertiary side-face blanks. They represent flake removals produced in this sequence after the original abrupt corners and unflaked surfaces had been removed but prior to the detachment of recognizable flakes from large bifacial cores. In other words, they, along with previously described types in this reduction sequence, can be viewed as preliminary shaping flakes intended to turn the original quarry block into a biface core. Tertiary side-face blanks can be quite thick with pronounced bulbs (Table 4.14) and are often more wedge-shaped in longitudinal section. They exhibit some curvature which is often distal in placement. Cross-sections are flat with high core facet angles (Table 4.6). These blanks are inferred to be from the preliminary stages of biface core production for two reasons. First, they often have bidirectional scars (Table 4.6) as is to be expected of flakes produced in forming bifaces since the ovate bifaces by definition possess two opposing edges which serve as striking platforms. Second, as will be discussed below, the biface cores had well-defined lateral edges from which most flakes were produced. These edges were oriented such that the flakes struck off had longitudinal banding (e.g. 60-90°). Thus, we should expect the preliminary shaping flakes to have a similar banding as they would be removed in the same direction to produce such platforms.

Table 4.19: Scar Orientation by Blank Type.

Blank Type	Unidirectional-Parallel	Bidirectional-Parallel	Other Parallel	Bidirectional-Convergent	Trans-verse	Complex/ Other
Primary Top-Corner	-	-	-	-	-	-
Secondary Top- Corner	3	-	1	-	-	
Primary Top-Face	-	-	-	-	-	-
Tertiary Top-Face	3	-	1	-	-	-
Primary Side-Corner	1	-	-	-	-	1
Secondary Side-Corner	4	3	-	-	-	1
Primary Side-Face	-	-	-	-	-	-
Secondary Side-Face	1	6	1	-	-	-
Tertiary Side-Face	3	4	3	1	-	-
Normal Biface Core Flake	-	2	-	12	-	-
End Biface Core Flake	-	-	-	-	2	-
Totals	15	15	6	13	2	2

At a certain point, the side-face removals produced a biface core with a lenticular transverse section (Figure 4.2K-L) from which recognizable flakes from such cores were detached. Two blank types produced in the reduction of biface cores are represented in the collections: normal or lateral flakes from biface cores and end flakes from biface cores. These blank forms should not be confused with the smaller biface thinning flakes described along with the flaking debris in Chapter 7. As implied above, these biface cores had recognizable lateral edges from which most blanks were detached. They were not circular. This fact is indicated by the simple presence of identifiable end removals from such cores as will be described below. It is also indicated by the banding orientation on the flakes. On normal or lateral removals, this banding almost exclusively follows the longitudinal axis of the

Table 4.20: Curvature Placement by Blank Type.

Blank Type	None	Distal	Symmetrical	Proximal
Primary Top-Corner	-	1	-	-
Secondary Top- Corner	-	3	-	-
Primary Top-Face	1	1	-	-
Tertiary Top-Face	2	1	1	-
Primary Side-Corner	-	-	2	-
Secondary Side-Corner	-	5	3	-
Primary Side-Face	1	-	1	-
Secondary Side- Face	4	1	3	-
Tertiary Side-Face	1	2	8	-
Normal Biface Core Flake	-	-	15	-
End Biface Core Flake	-	-	1	1
Totals	9	14	34	1

flake (e.g. 60-90°;Table 4.13). If the cores were circular, we should not expect such patterning. Rather, banding would be at any direction to the flake's long axis. The longitudinal banding also suggests that the biface cores on Collingwood chert were consistently oriented in the same way versus the original quarry block. In essence, on the biface cores, the banding would consistently appear at right-angles to the longitudinal axis of these cores (as on Figure 4.2K). It is only in this way that lateral removals from the core would exhibit primarily longitudinal banding (Figure 4.2L). This characteristic would also lead us to expect end flakes from such cores to exhibit banding at right-angles to the longitudinal blank axis and this result is indeed the case (10-20°; Table 4.13). Several of the normal or lateral flakes from biface cores in the assemblage are on Bayport and Onondaga chert indicating this core form was also produced on these materials.

Regardless of material, these flakes exhibit several characteristics indicating they were detached from bifaces. Platforms are acute-angled (Table 4.9) and are usually highly prepared (Table 4.21). Dorsal scars are primarily convergent-bidirectional (Table 4.19). The flakes are relatively small (especially with regard to thickness), tend to be expanding and are curved in longitudinal section. End flakes from biface cores also have highly prepared platforms (Table 4.21). They differ from the normal or lateral removals in that because of detachment from the end of the core, they can be much larger (Table 4.2), tend to have little curvature (Table 4.8) and exhibit transverse dorsal scars patterns representing previous lateral removals (Table 4.19). The biface cores were apparently of an impressive size. One end removal (Figure 6.18a) clearly suggests they exceeded 100 mm in length. Lateral removals suggest width was in

Table 4.21: Platform Preparation by Blank Type.

Blank Type	Cortex	Cortex, Reduced	Plain	Plain, Reduced	Plain, Ground, Reduced	Dihedral	Dihedral, Reduced	Faceted, Ground	Faceted, Reduced, Ground	Isolated, Faceted, Reduced Ground
Primary Top-Corner	-	-	-	-	-	-	-	-	-	-
Secondary Top-Corner	-	1	-	-	-	-	-	-	-	-
Primary Top-Face	1	-	-	-	-	-	-	-	-	-
Tertiary Top-Face	-	1	-	1	-	-	-	-	-	-
Primary Side-Corner	-	-	-	2	-	-	-	-	-	-
Secondary Side-Corner	-	-	1	1	-	-	-	1	-	-
Primary Side-Face	-	-	-	1	-	-	-	-	-	-
Secondary Side-Face	-	-	-	1	1	1	1	-	1	-
Tertiary Side-Face	-	-	2	2	-	-	-	-	-	-
Normal Biface Core Flake	-	-	-	-	-	-	-	4	9	-
End Biface Core Flake	-	-	-	-	-	-	-	-	1	1
Totals	1	2	3	6	1	1	1	5	11	1

the range of 60 to 100 mm. There are some large biface tools in the Parkhill assemblage (large alternately bevelled bifaces) which are in the range of size noted above and which are most likely made on biface core nuclei. Consistent with this interpretation is a banding roughly at

Table 4.22: Distribution of Marginally Retouched Bifaces and Unifacial Tool Forms by BlankTypes.*

Artifact Type	Primary Top-Corner	Secondary Top-Corner	Primary Top-Face	Tertiary Top-Face	Primary Side-Corner	Secondary Side-Corner
Marginally Retouched Bifaces	-	-	-	2	-	-
Trianguloid End Scrapers	-	1(2)	-(1)	-	1	2
Large Parallel-Sided End Scrapers	-	-	-	-	-	1
Laterally Notched End	-	-	-	-	-	-
Narrow End	-	2	1	-	-	1
Offset End	-(1)	-	-	1	-	1
Other End	-	1	-	-	-	-
Simple Beak	-	-	-	-	-	1
Hafted Perforator	1	-	-	-	-	-
Simple Graver	-	-	-	-	-	-
Denticulate	-	-	-	1	-	1
Notch/Borer/ Denticulate	-	-	-	1	-	-
Concave Side Scraper & Spurs	-	-	-	-	1	-(1)
Other Side Scrapers	-	1	1	-	1	1
Retouched Flakes	-	-	-	-	-	-
Other Unifaces	-	-	-	1	-	-
Totals	1	5	2	6	3	8

Table 4.22: Continued.

Artifact Type	Primary Side-Face	Secondary Side-Face	Tertiary Side-Face	Normal Biface Core	End Biface Core Flake	Other/ Unknown
Marginally Retouched Bifaces	-	-	1	-	-	-
Trianguloid End Scrapers	1	-	1(3)	8(9)	-	8(12)
Large Parallel-Sided End Scrapers	-	1(2)	1	-	-	5(6)
Laterally Notched End	-	-	1	2	-	-
Narrow End	-	1	1	3	-	-
Offset End	-	-	-	-	-	-
Other End	-	-	-	-	-	4
Simple Beak	-	1	-	-	-	2
Hafted Perforator	-	-	-	-	-	1
Simple Graver	-	2	3	-	-	10
Denticulate	-	-	1	-	1	-
Notch/Borer/ Denticulate	-	-	2	2	-	1
Concave Side Scraper & Spurs	-	-	-	(1)	-	2
Other Side Scrapers	1	3(4)	2	-	1	2
Retouched Flakes	-	-	-	-	-	30
Other Unifaces	-	-	-	-	-	2
Totals	2	8	13	15	2	57

*totals in brackets include items recycled into other uses; other/unknown includes items made on flaking debris such as channel flakes (N=15), normal biface thinning flakes (N=3), end biface thinning flakes (N=3) and normal uniface retouch flakes (N=3).

right-angles to the longitudinal axis on these tools (see next chapter).

Summary

In summation, two primary reduction sequences are suggested by the Parkhill site assemblage for the processing of Collingwood chert. Both began with a quarry block and in both, a relatively standardized reduction procedure was followed. One sequence led to the production of a unidirectional block core while the other resulted in a large biface core. Numerous consistent blank forms or types were produced at various junctures in these sequences as diagrammed on Figures 4.1 and 4.2. The distribution of the various tool types on flakes by blank types are shown on Table 4.22.

CHAPTER 5

FLUTED POINTS AND OTHER BIFACIAL TOOLS

by William B. Roosa and Christopher Ellis

Fluted Bifaces

The Parkhill site collections include a large sample of 133 fluted bifaces or fragments thereof. Indeed, these items represent the single most common artifact class in the assemblage. Aspects of this sample have been summarized elsewhere (Roosa 1977b; Roosa and Deller 1982) but for this report a complete reanalysis was undertaken and these analyses supercede those previously reported.

The fluted biface sample can be subdivided into three major categories for descriptive purposes: finished fluted points, fluted preforms, and a residual category of items too incomplete to assign to the fluted point or preform category. The condition of this sample, and its distribution by site area and raw material type, is given on Tables 5-1 to 5-5. Also, measurements for each relatively complete point and preform are presented in Appendix A.

As well as the fluted bifaces there are five probable preforms in pre-fluting stages of manufacture. These will be described after the fluted bifaces. Next, aspects of fluted point manufacture, use, reworking and recycling will be delineated.

The Sample

Finished Points

Some 106 items are finished points or fragments thereof (Tables 5.1, 5.6 -5.10; Figures 5.1 to 5.6). Two of these are only basally thinned rather than fluted (e.g. Figure 5.2j) but are included here since they appear to represent part of a continuum from basal thinning through to partial fluting and full fluting. Two tip segments lacking flute remnants are also included (e.g. Figure 5.4a). These seem to be items which snapped beyond the extent of facial fluting.

The Parkhill site points have been assigned by Roosa (1977a, 1977b) to the Barnes type previously defined on the basis of the sample from the Barnes site in Michigan (Roosa 1965, 1968; Wright and Roosa 1966). Comparison of a large sample of the Parkhill points to Barnes forms reported from other sites has demonstrated their essential homogeneity and their distinctiveness from samples representative of two other types in the Great Lakes: Gainey and Crowfield (Deller and Ellis 1992b; Ellis and Deller 1997; Wright 1981). Hence, the discussion here will confine itself to characterizing the total Parkhill sample with a minimum of external comparisons.

The finished points are frequently fishtailed (Table 5.8) with ear flaring resulting in a one or two mm expansion of the base. Nonetheless, bases are relatively narrow (under 20 mm) as is characteristic of Barnes points. Comparison of continuous variables within the Parkhill assemblage indicate that basal width and "waist" or "constriction" width (e.g. the width on fishtailed examples just above the ear-flaring at the narrowest part of the base) are

Table 5.1: Distribution of Fluted Points by Site Areas.

Type	A/J	B	C	D	E	G	H	I	K	Other	Total
Bases	4	33	14	6	-	-	-	-	-	-	57
Relatively Complete	3	3	1	2	1	-	-	1	1	1	13
Ears/Basal Halves	-	15	3	2	-	-	-	-	-	-	20
Tips/Fore-Sections	1	3	1	3	2	-	-	-	-	1	11
Mid-Sections	-	4	1	-	-	-	-	-	-	-	5
Totals	8	58	20	13	3	-	-	1	1	3	106

Table 5.2: Distribution of Fluted Preforms by Site Areas.

Type	A/J	B	C	D	E	G	H	I	K	Other	Total
Bases	1	1	-	-	-	-	-	-	-	-	2
Relatively Complete	-	1	1	-	-	-	-	-	-	-	2
Tips/Fore-Sections	-	6	2	2	1	-	-	-	-	-	11
Totals	1	8	3	2	1	-	-	-	-	-	15

Table 5.3: Distribution of Residual Fluted Bifaces by Site Areas.

Type	A/J	B	C	D	E	G	H	I	K	Other	Total
Ears	-	1	-	1	-	-	-	-	-	-	2
Tips/Fore-Sections	-	1	-	3	-	-	-	-	-	-	4
Lateral Edges	-	1	2	-	-	-	-	-	-	-	3
Recycled	-	2	1	-	-	-	-	-	-	-	3
Totals	-	5	3	4	-	-	-	-	-	-	12

among the least variable of all characteristics as measured by the coefficient of variation (Table 5.6). At least in the case of basal width (constriction width is rarely reported), this result is the same as that reported for other Barnes point assemblages (e.g. Deller and Ellis 1992b: Tables 12-16) and is also seen in fluted point assemblages farther afield as in Folsom (Judge 1973:171-172). This minimal variation seems to be explained best by some constraint involved in hafting.

Table 5.4: Distribution of All Fluted Bifaces by Site Area.

Type	A/J	B	C	D	E	G	H	I	K	Other	Total
Points	8	58	20	13	3	-	-	1	1	2	106
Preforms	1	8	3	2	1	-	-	-	-	-	15
Other	-	5	3	4	-	-	-	-	-	-	12
Totals	9	71	26	19	4	-	-	1	1	2	133

Table 5.5: Distribution of Fluted Biface Sample by Raw Material.

Type	Collingwood (Fossil Hill)	Onondaga	Bayport	Unknown	Total
Points	92	3	9	2	106
Preforms	13	1	1	-	15
Other	10	2	-	-	12
Totals	115	6	10	2	133

Table 5.6: Fluted Point Variables, Parkhill Site.*

VARIABLE	N	RANGE	MEAN	S.D.	C.V.
Length	6	37.9-53.0	46.85	6.399	13.66
Width	26	11.1-25.2	20.61	3.040	14.75
Thickness	32	4.5-7.9	5.68	0.768	13.52
Width/Thickness Ratio	26	2.1-4.4	3.56	0.523	14.69
Basal Width	27	13.0-19.2	16.76	1.404	8.38
Face-Angle	59	92.5-103.5	97.54	1.6512	1.69
Waist Width	28	13.5-18.5	15.70	1.193	7.60
Basal Concavity Depth	50	1.2-6.4	3.74	1.101	29.44
Flute Length	21	12.4-41.0	24.01	7.267	30.27
Flute Width	64	5.5-16.1	10.78	2.375	22.03
Flute Surface Width	62	7.0-17.5	11.47	2.386	20.80
Grinding Length	28	10.2-20.0	14.89	2.328	15.64

*: N= # of specimens; S.D.=standard deviation; C.V.=coefficient of variation; measurements in mm.

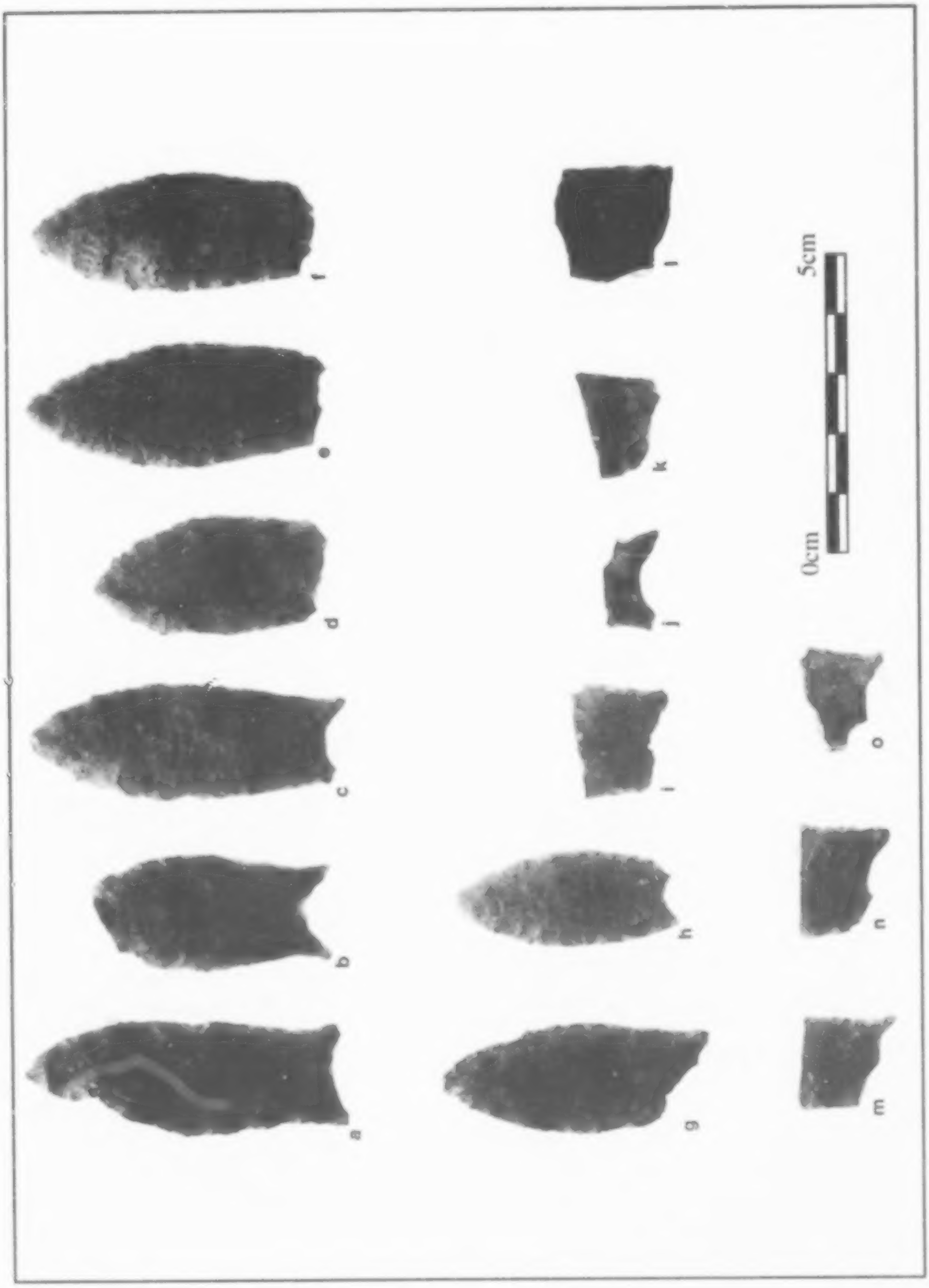
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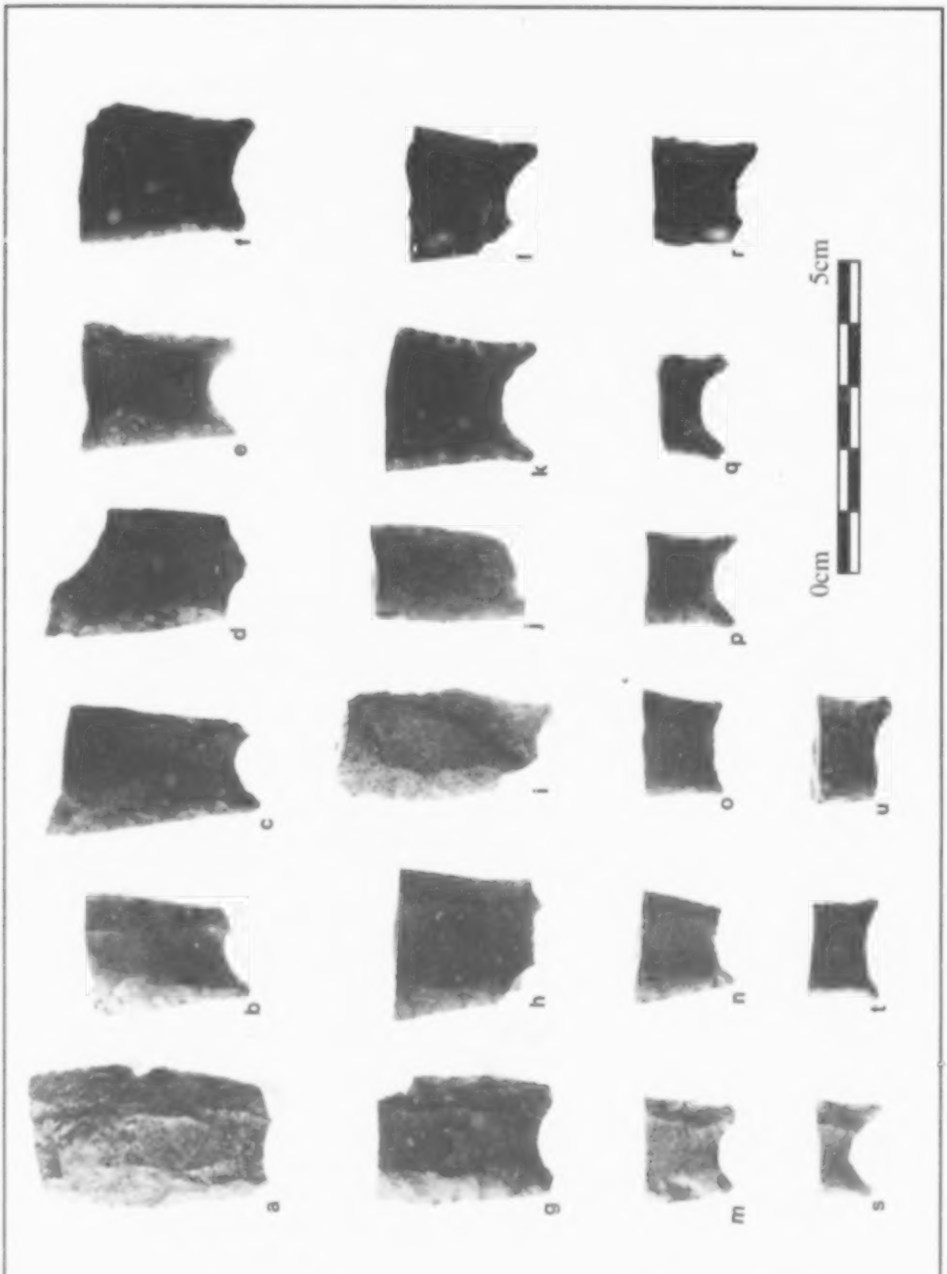
Figure 5.1: Relatively complete finished fluted points and bases.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0cm
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Figure 5.2: Fluted point bases.

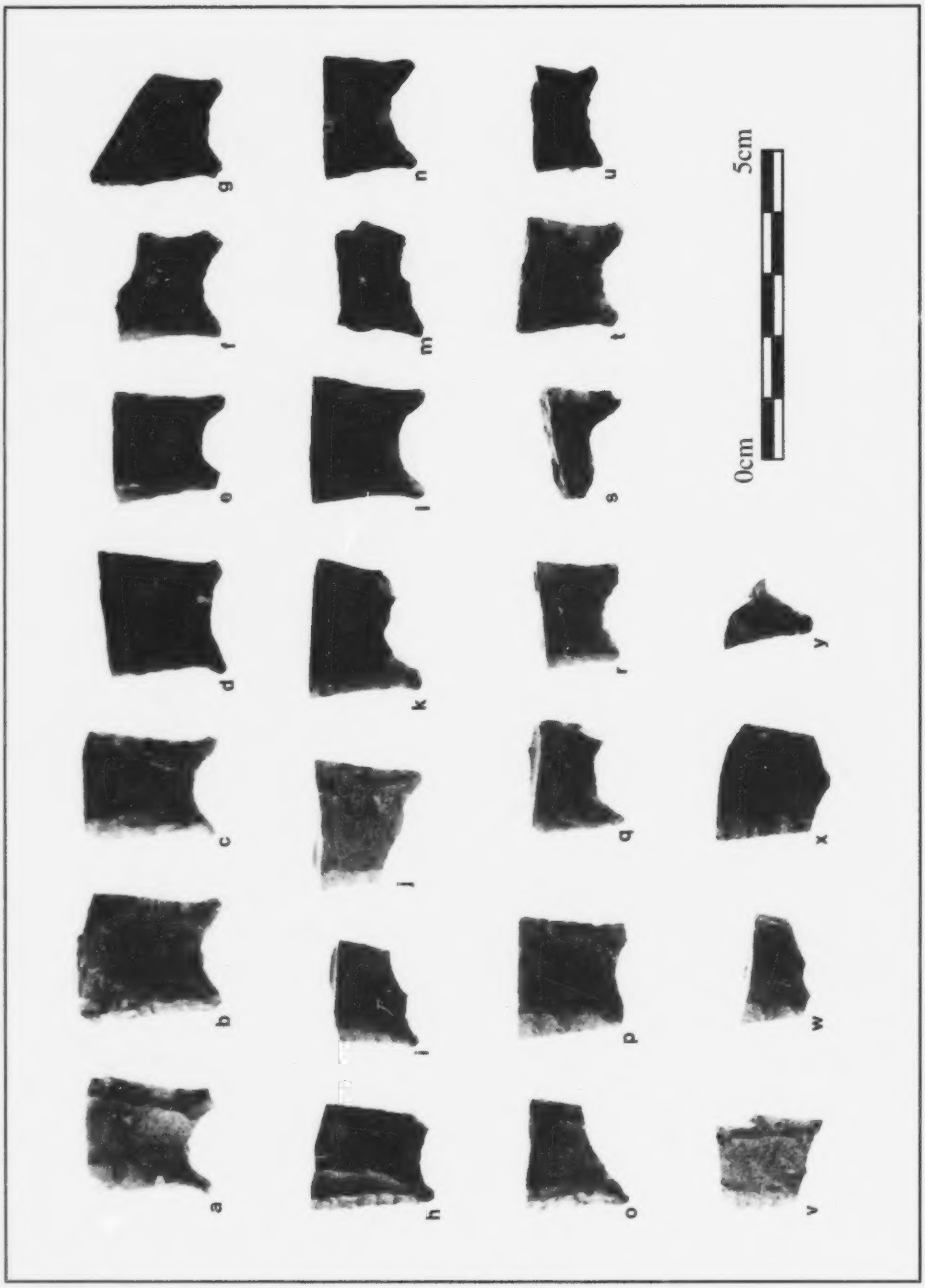
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Figure 5.3: Fluted point bases and basal half.

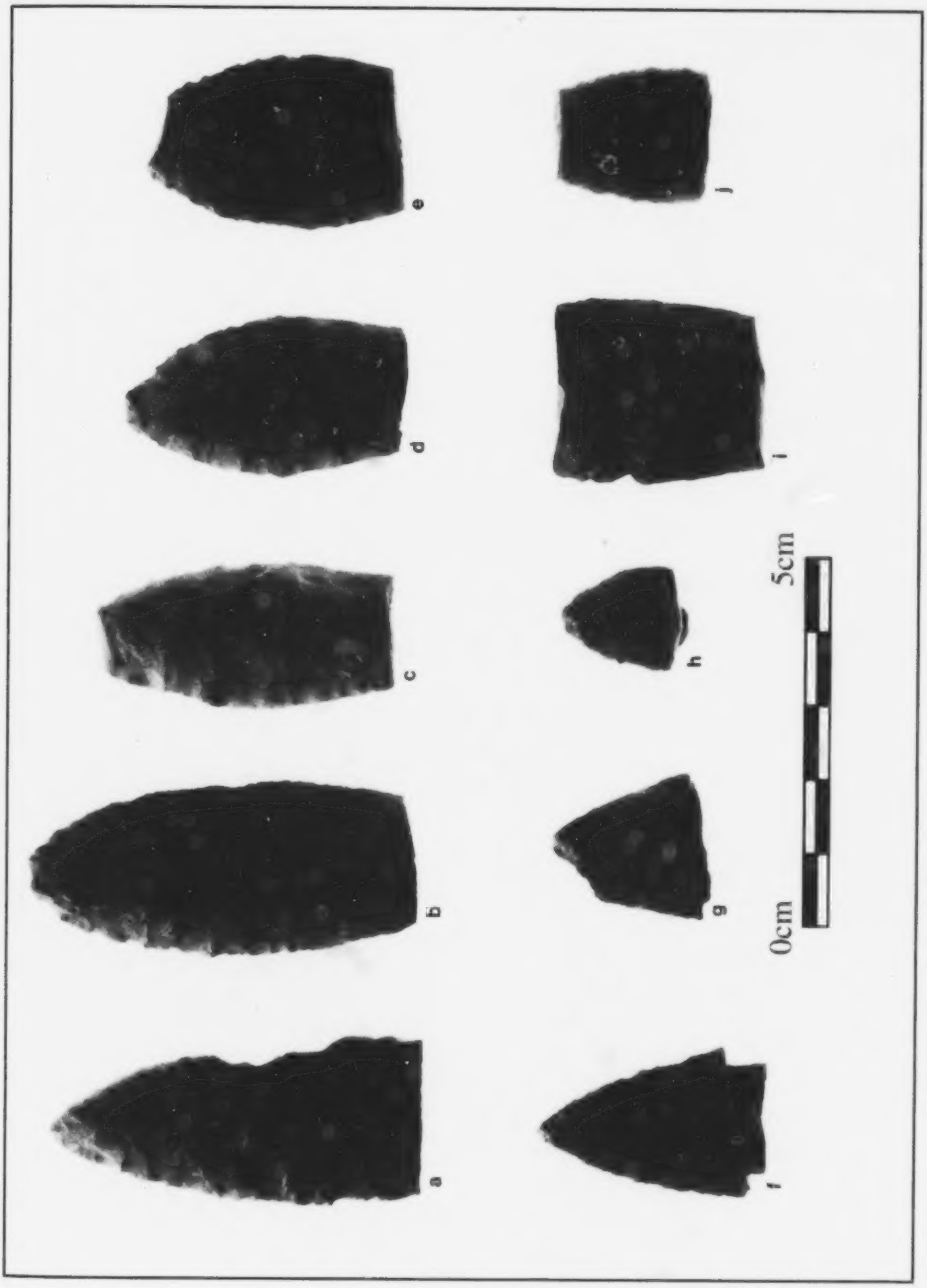
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Figure 5.4: Fluted point fore-sections (a-h) and mid-sections (i-j).

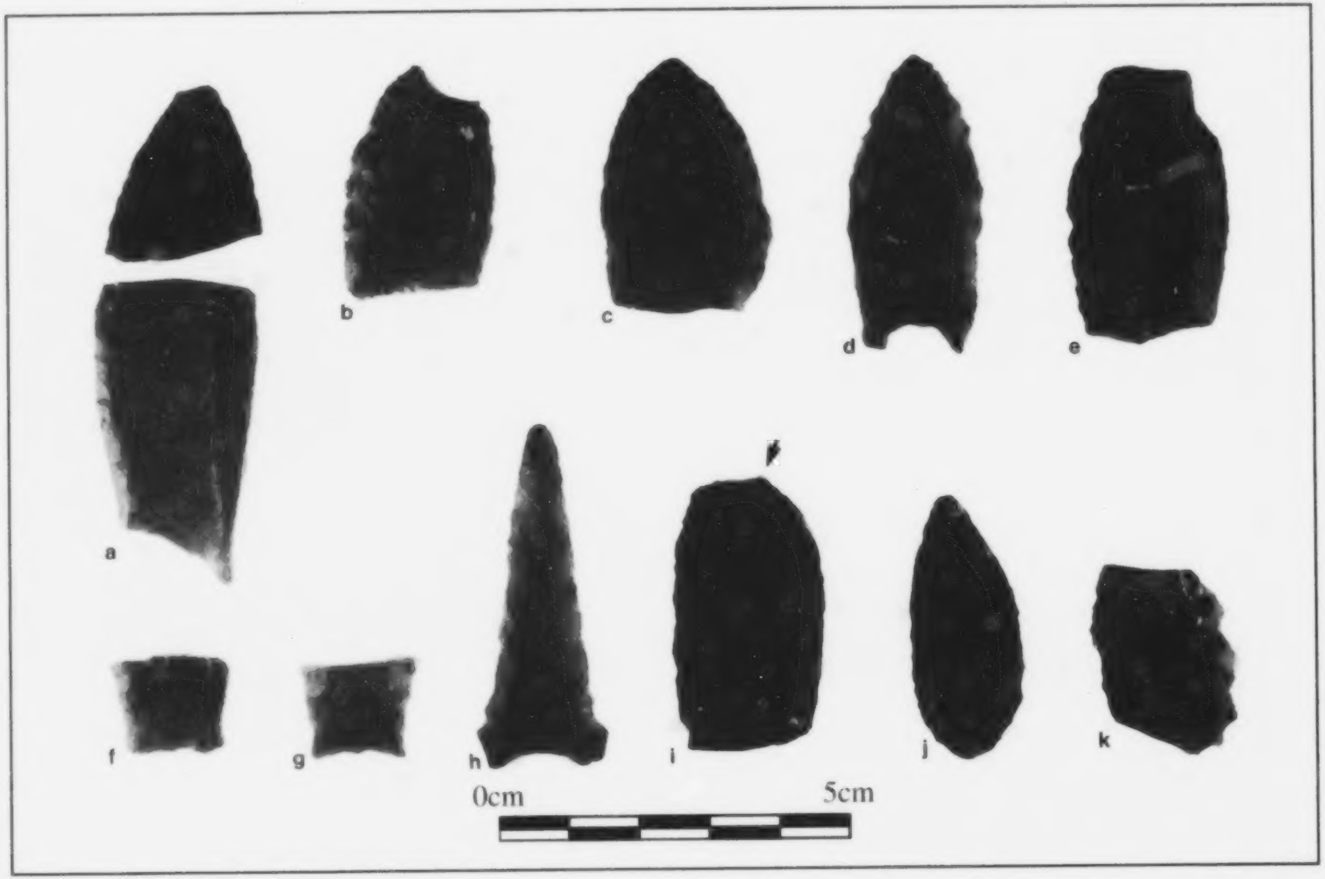


Figure 5.5: Reworked and recycled fluted bifaces. a: broken point with basal segment subsequently modified along one (right) edge; b-c: recycled fluted point fore-sections ("blades"); d: fluted point with evidence of attempts to narrow broken basal section for rehafting; e: fluted point with attempt at refluting after basal breakage; f-g: fluted point bases which had been broken at base, narrowed and then reused; h: possible fluted drill (but notch remnants suggest is not Paleo-Indian); i: fluted biface with alternately retouched spur (indicated by arrow) at tip; j-k: reworked fluted biface fore-sections ("blades").

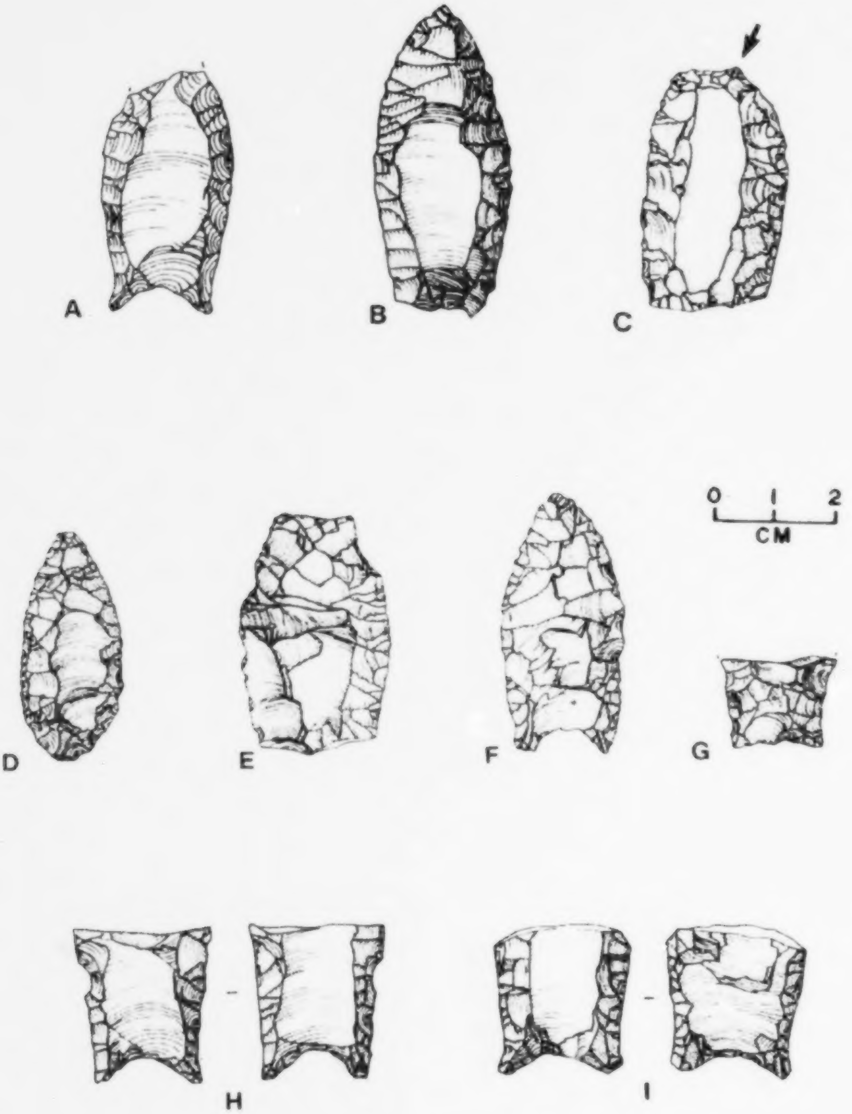


Figure 5.6: Fluted bifaces. A: tip-impacted point; B: point fore-section with damaged base; C: fluted biface with alternately retouched piercer or graver at tip; D: heavily recycled "tear-drop" shaped fluted point fore-section; E: attempt to reflute damaged fluted point from central projection – note tip-narrowing; F: fluted point in process of narrowing lateral basal edges; G: fluted point base reworked by narrowing – note lateral flake scars from reworking superimposed on base base of flute; H-I: snapped fluted point bases.

Table 5.7: # of Flutes Per Face, Points.*

# OF FLUTES	N	PERCENTAGE
0-0	2	2.7%
1-0	5	6.7%
2-0	3	4.0%
1-1	52	69.3%
1-2	13	17.3%
Total	75	100.0%

*: N = Number of items; 0-0 = no flutes on either face; 1-0 = only fluted on one face; etc.

Table 5.8: Presence of Fishtails, Points.

CONDITION	N	PERCENTAGE
Present	46	68.7%
Slight	10	14.9%
Absent	11	16.4%
Totals	67	100.0%

Table 5.9: Fluting to Tip, Points.

CONDITION	N	PERCENTAGE
On Both Faces	6	30.0%
On One Face	7	35.0%
None	7	35.0%
Totals	20	100.0%

Table 5.10: Barnes Finishing Technique.

CONDITION	N	PERCENTAGE
On One Face	35	53.8%
On Both Faces	15	23.1%
None	15	23.1%
Totals	65	100%

Although basal width and constriction width seem tightly constrained, Roosa long believed that there might be two size categories amongst the Barnes fluted points based on these characteristics. Plotting of basal width for the Parkhill sample provides little support for this contention (Figure 5.7). However, there is a slight suggestion of a bimodal distribution for constriction width (Figure 5.8). The meaning of such variation is, however, not clear. It may indicate some kind of functional or use variation among the point category even though all evidence suggests both sizes were used as projectile tips (see below). Yet, it is notable that most of the larger items (e.g. with wider waists) are in fact on Bayport or Onondaga chert (Figure 5.9) which might suggest raw material is playing a role here. Still another complication is introduced by the fact all of the measurable points on Bayport or Onondaga for this characteristic are from one site area A/J as will be discussed in the context of site areas and overall site layout in later chapters. Deller and Ellis (1992b:45) have suggested there are time trends with larger points being earlier and so, there may be changes over time represented in the Parkhill assemblage as a whole.

From the constriction above the fishtails (if present), the lateral point edges moderately expand to a maximum width at or, if only lightly resharpened, just below mid-point. As measured by the face-angle (Wright 1981), these edges expand at an angle on the order of 92.5 to 103.5°. It is notable that the face-angle varies very little in the assemblage and seems to be the most tightly constrained of all point attributes even in comparison to basal and waist width as measured by the coefficient of variation (Table 5.6). Since this attribute varies so little, and yet contrasts in range with the angles of other types, it is no surprise it is one of the most diagnostic of all Barnes points characteristics.

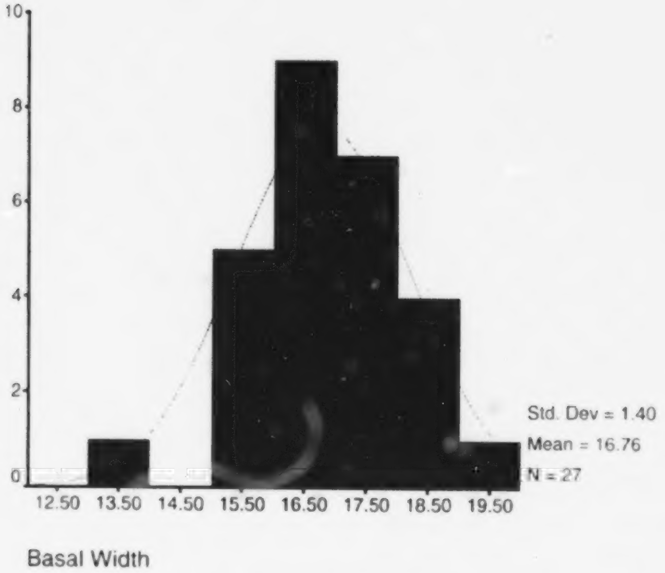


Figure 5.7: Basal width (in mm), fluted points.

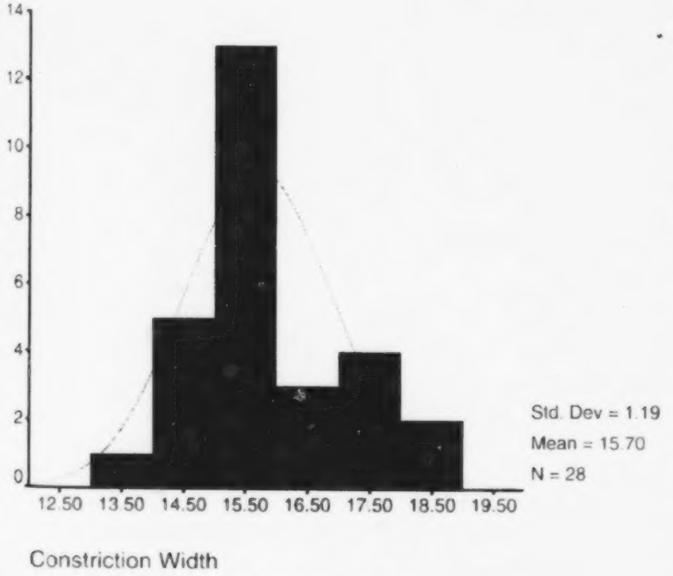


Figure 5.8: Constriction width (in mm), fluted points.

Around mid-point, transverse sections are usually markedly biconvex or at least, were so prior to fluting. By extension, the points are relatively narrow and thick with a low width to thickness ratios on the order of 2.1 to 4.4 (Table 5.6). Exceptions to these cross-sections are three points (e.g. Figures 5.1h, 5.3h) which are markedly plano-convex in cross-section. Two of these items are notable in that they retain on the plano face a flat, unaltered (i.e. devoid of secondary retouch) portion of the ventral face of the flake upon which they were made. In one case, this unaltered segment is small but on the other (Figure 5.1h) it covers the whole extant face with the exception of the marginal retouch. This procedure resulted in a "pseudo-flute" as reported also for Folsom points from the Lindenmeier site (Wilmsen and Roberts 1978: Figure 110). These three points with plano-convex cross-sections were clearly made directly on relatively small, thin flakes as opposed to the normal practice where large flakes or core blanks were selected and where the blank was reduced through a series of intermediate biface forms to the finished product (see below).

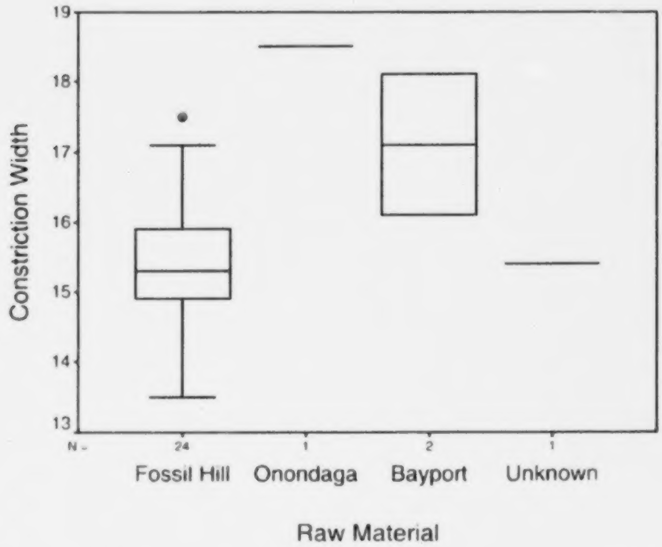


Figure 5.9: Boxplot of constriction width (in mm) by raw material, points. The box represents the 25th (lower) and 75th (upper) percentiles (Tukey's hinges) and is crossed by a line representing the median. Outliers, or cases with values 1.5 to 3 box-lengths beyond the 25th and 75th percentiles, are indicated with a black dot. The lines extending from the boxes (whiskers) show the range of values which are not outliers.

Basal concavities are moderately deep (Table 5.6). Without exception, the concavities lack the fine finishing retouch around their margins which is characteristic of types such as Folsom and Crowfield. Instead, the fine basal retouch is selectively rather than continuously applied. Basal concavities are often simple concave arcs in plan. However, in some cases (e.g. Figures 5.1m, 5.2h, p, r, 5.3j, etc.), the apex of the concavity is a straight margin resulting in what have been referred to as "squared-off" (Ellis 1984:301) or "u-shaped" (Storck 1983: Plate 5IIa-b) concavities. To our knowledge, this form of base only occurs on Barnes and some Crowfield points in the eastern Great Lakes region. It is lacking on Gainey type points.

Facial flaking consists of a parallel-collateral retouch which consistently terminated along the mid-line forming a medial ridge to guide flute removals (Storck 1983, 1997). After such flaking and fluting, edges were regularized by a short, selective, intermittent retouch. Fluting varies considerably in the assemblage. Nevertheless, the tendency is for well-centered fluting with usually one flute, and never more than two flutes, to a face (Table 5.7). Individual flutes *per se* are relatively narrow being around 11 mm on average (Table 5.6). In fact, the flute surface widths as a whole (i.e. including the maximum width of the surface on multiple fluted faces) are also just above 11 mm (Table 5.6). Without exception, fluting originates at the base rather than the tip as can occur in Folsom. Barnes points tend to have long flutes and some spectacular examples with flutes over 80 mm long are reported from the Thedford II site (Deller and Ellis 1992b: Figure 21). However, based on the measurable sample from Parkhill, the average length is only ca. 25 mm (Table 5.6). This average though is quite misleading for several reasons.

First, complete measurable points tend to be resharpened which reduces flute length. Indeed, the spectacular examples of long flutes noted above can only be measured or even seen on unresharpened points or late stage preforms. The finished unresharpened points only occur in special situations such as through simple loss or, as is the case at Thedford II, through unretrieved caches of tools. Second, a bias is introduced towards short flutes because only short complete flutes will be retained on broken items. Finally, and although there is the odd exception (Figure 5.1b, 5.6a), relatively complete *yet still discarded* points in the Parkhill assemblage tend to exhibit short flutes whereas incomplete ones, especially tip sections, suggest longer fluting was the norm. For example, several fragmentary examples in the assemblage from Parkhill (e.g. Figures 5.1e, 5.4b, d, 5.5a-b) clearly had flutes over 50 mm in length. The short fluting on complete points has been noted in other Barnes point collections such as Thedford II (Ellis 1984:152) and also appears to be the case at Fisher (e.g. Storck 1997: Plate 3.8h, 3.8j). The reason for this inconsistency between complete and fragmentary points will be discussed below.

Given the above problems with using simply average flute length to characterize fluting, other means of characterization need to be developed for inter-assemblage comparisons. Percentage of points with fluting to or near the tip has been suggested as an alternative (Ellis 1984:152-153) although even this measure is not without problems. Be that as it may, of the 20 points where such estimates are possible at Parkhill, 65% are fluted to within 15 mm of the tip end on at least one face (Table 5.9). This percentage appears to be much higher than that found on other Great Lakes fluted point types. For example, only ca. 7% of the points at the Crowfield site were fluted to the tip (Ellis 1984:285-292) although it must be noted that the points at that site were not heavily resharpened. Another factor suggesting Parkhill points are well-fluted is the simple fact that channel flakes are easy to identify as in Folsom. On sites with poorly fluted points, such as those of the Clovis type in western North America, channel flakes are difficult to identify and in fact, are rarely reported (Frison 1982:153).

Another distinctive characteristic of the Parkhill sample is the frequent presence of the "Barnes finishing technique" (Roosa 1965:91). This technique involves the removal of a short, broad flake over the base of the main flute, presumably to more substantially thin the base, widen the base of the flute scar, and/or remove remnants of the basal preparation for fluting. This technique is found also on Gainey type points but is absent on other eastern fluted point forms such as Cumberland and Crowfield and western forms such as Clovis. It occurs on one or both faces of over 76% of the present sample (Table 5.10).

A final notable characteristic of the Parkhill site fluted point assemblage (and the preforms as well) concerns the banding orientation on Collingwood chert points. As noted elsewhere (Deller and Ellis 1992b: Figure 41; Ellis 1984: Figure 23), there is a strong tendency for the bands to appear at right-angles to the longitudinal axis of the point (0 to 5° in the method of measurement) rather than at other angles such as following the longitudinal axis of the point (85-90°; see Figure 5.10). This feature suggests a preference for the use of certain kinds of blanks which were specifically produced largely for point production although other interpretations are possible (see below).

Fluted Preforms

Given the large number of finished points and channel flakes from the site, it is significant that fluted preforms are comparatively rare and are represented by only 15 specimens (Table 5.2; Figure 5.11). These items can be identified as preforms on the basis of one or more of the following features: 1) extant evidence of basal or tip preparation for

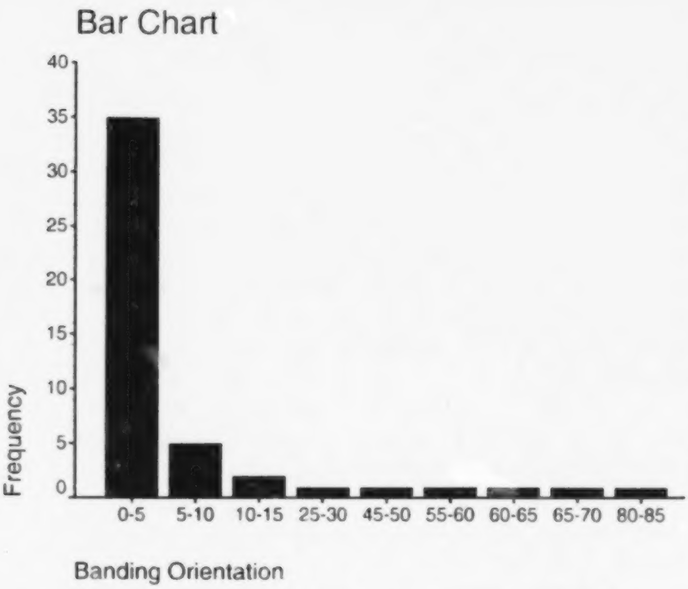


Figure 5.10: Banding orientation, Collingwood chert fluted bifaces. Increments without examples are omitted.

fluting, 2) a lack lateral basal grinding, 3) the absence of a fine, edge regularization, finishing retouch (as a result, they often appear to have "serrated" edges) and 4), presence of breaks definitive of manufacturing errors.

One of the items (Figure 5.11a) is complete and unbroken, yet lacks lateral grinding and edge regularization retouch. This item may not have been finished because it only has a very short (ca. 12 mm), markedly hinge-terminated "flute" (basal thinning?) on one face. As a result of the short flute it may have been too thick to haft. Moreover, because of the hinge-termination refluting attempts would have been precluded because subsequent flutes would tend to terminate at that hinge. Another preform (Figure 5.11b) is represented by a tip and a base but the mid-section is missing. A channel flake successfully removed from one face of this point was recovered. This preform appears to have been broken by a perverse fracture during attempts at finishing.

Two specimens are basal segments. One (Figure 5.11h) has a marked plano-convex cross-section, is relatively thin (4.2 mm) and has a remnant of the original ventral flake blank surface on one face. Clearly this item represents an attempt to make a point directly on a thin flake as is evident on the three finished points discussed earlier. This preform is also notable in that it has been fluted on the plano face but the convex face exhibits large, broad, primary flakes rather than the more diminutive lateral retouch designed to prepare a medial ridge to guide the flute removal. In sum, the preform was not bifacially prepared on both faces by parallel-collateral flaking prior to fluting attempts. This unifacial preparation is reported in Folsom assemblages (Flenniken 1978) and is reported on Barnes points from the Fisher site (Storck 1983:82, 1997:56). The present item, as well as the illustrated items from the Fisher site (Storck 1983: Plate 1: II, III, 1997: Plate 3.4a-c), are notable in that they all seem to represent attempts to make points directly on small thin flakes -- a practice which does not appear to be the norm for Barnes points as witnessed, for example, by the infrequent occurrence of plano-convex transverse sections. This association of unifacial preparation with "small flake" points suggests the manufacture of Barnes points on such flakes presented certain problems which required a different reduction procedure

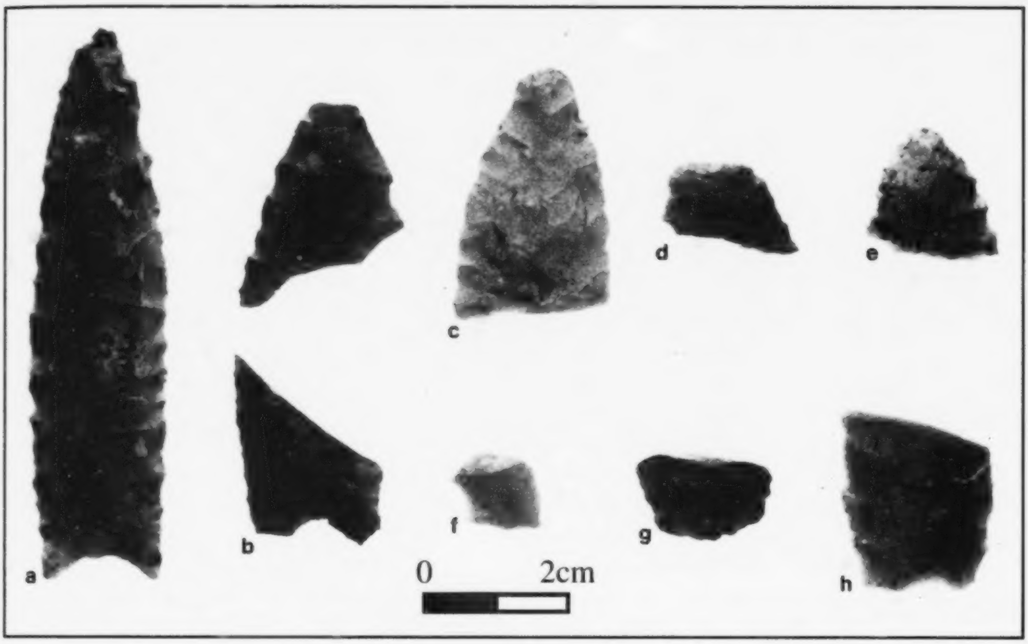


Figure 5.11: Fluted preforms. a-b: relatively complete; c-f: tip ends; g-h: bases.

for fluting than that normally applied. It also suggests a contrast with Folsom where unifacial preparation was apparently applied to most blanks (at least at the Lindenmeier Folsom site; Flenniken 1978).

The other basal preform segment from Parkhill (Figure 5.11g) is quite short (12.5 mm) and was broken during an attempt to flute the first face by a plunging or outre-passé flute termination very close to the base. The channel flake removed in this attempt was also recovered and it possesses a thick distal end as a result of this kind of fluting failure. When placed on the preform base, this channel flake clearly shows the basal preparation for fluting of Barnes points outlined in detail elsewhere (Storck 1983, 1997:60; Wright and Roosa 1966:852-854) including bevelling of the base to create a striking platform surface and isolation of a fluting platform by two tiny guide flakes from the face to be fluted.

The remaining ten fragments are all tip ends (e.g. Figure 5.11c-f). Seven of these are quite short (under 14 mm) and were removed by flutes plunging through the tip of the biface. The short length of these items, combined with the fact most are from extensively excavated site areas yet the basal segments were not recovered, suggests that despite the tip breakage, the remaining preform bases were long enough to be finished into points and were removed from the site (Ellis and Payne 1995). This process has been demonstrated to have occurred at other Parkhill Phase sites (Deller and Ellis 1992b:33), as well as at other sites in eastern North America (Ellis and Payne 1995), and on Folsom sites in the west (Tunnell 1977). All the preform tips are blunt-ended. On eight of ten which are

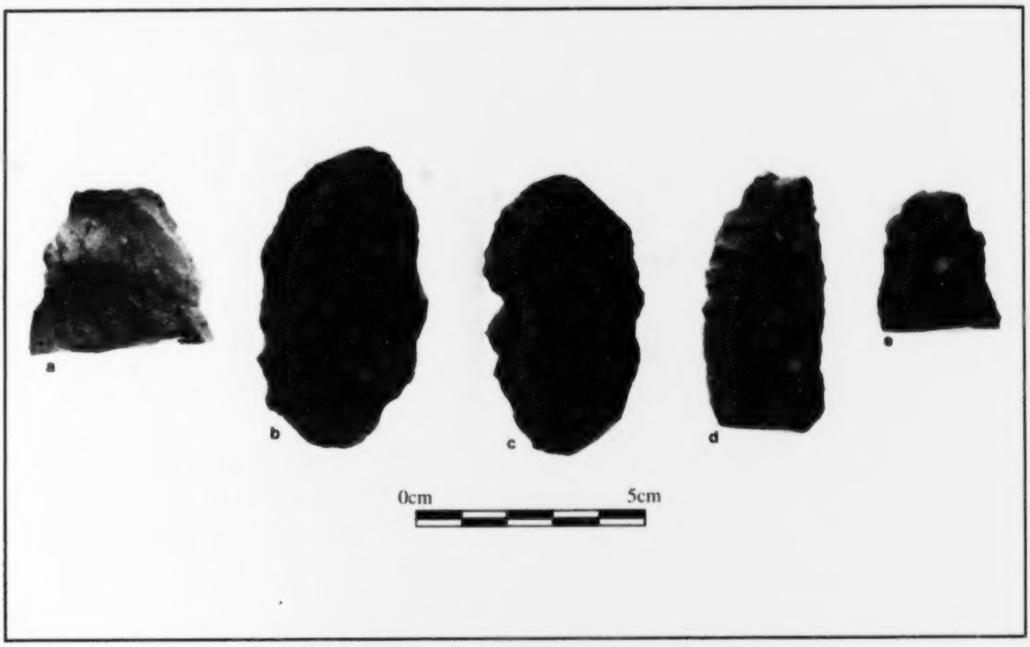


Figure 5.12: Unfluted preforms.

wholly complete, the end has been ground. Six also exhibit a distinctive tip narrowing or "tonguing" (e.g. Figure 5.11c-d). This narrowing is characteristic of Barnes preforms at other sites and it has been suggested that this is positive evidence of the use of a holding device in fluting (Deller and Ellis 1992b:32).

Other Fluted Bifaces

The remaining twelve bifaces cannot be assigned to the point or preform category (Table 5.3). These consist largely of tiny fragments. Some of the tips lack fluting remnants but given their small size it seems most likely they represent segments which broke beyond the fluted surfaces. Three items are unassignable because they have been extensively recycled. These recycled bifaces will be described fully in a later section.

Unfluted Preforms

Five bifaces are present which lack fluting but are believed to represent preforms in pre-fluting stages of manufacture. They retain remnants of ground and faceted marginal platforms and lack any fine edge regularization retouch which suggests they are unfinished. Moreover, they are too small, are of the wrong morphology, or lack specialized features which would permit their manufacture into the unfluted biface tools known in the Parkhill and other Parkhill Phase assemblages. These preforms can be divided into two groups.

The first group includes three larger items (Figures 5.12a-c; Table 5.11) which have been referred to elsewhere as thinning stage preforms (Ellis 1984:163). Two are complete and one is an end fragment. These bifaces are

Table 5.11: Unfluted Preform Data, Parkhill.*

FC#	OUTLINE FORM	LENGTH	WIDTH	THICKNESS
1110	Oval	64.0	37.1	9.7
1133	Oval	59.5	34.5	10.3
329	Oval	-	-	13.7
1109	Parallel-Sided	-	25.7	8.4
1130	Parallel-Sided	-	26.9	7.5

*: FC# = field catalogue number; measurements in mm.

oval in outline with convex lateral margins. All have remnants of platforms at one end indicating manufacture on large flakes. Although two have biconvex cross-sections, one has a slightly plano-convex transverse section which is also suggestive of manufacture on a flake. As well, this item and the end fragment have thickened areas adjacent to the platform which are undoubtedly remnants of a thickened bulbar area of the original flake blank.

These bifaces are covered by broad (ca. 15-35 mm), lateral thinning flake scars. On the complete items 13 and 16 such scars respectively are present. These scars travel from 1/2 to 3/4's of biface width. The thinning scars were removed selectively rather than in a patterned manner from continuously bevelled and ground platforms. Two bifaces appear to have been discarded because of step or hinge terminations on existing flake scars which would prohibit continued thinning of that area of the biface. Two of the bifaces are on the banded Collingwood variant chert. In one instance, the bands appear at right-angles to the longitudinal axis which would be consistent with intended use as a fluted point preform since that banding orientation predominates on the fluted bifaces. On the other biface, however, the bands run almost end to end.

The second grouping of bifaces includes two items (Figure 5.12d, e; Table 5.11). They are narrower, thinner and more parallel-sided than the previous items and represent a more refined state of reduction. The thinning scars are generally smaller (ca. 15-30 mm in width) and on one face of one of these items, parallel-collateral retouching was initiated to prepare surfaces for fluting. This item was probably discarded because of a material flaw. In the case of the other biface, represented by an end fragment, discard may have been precipitated by a transverse manufacture break. Both of these bifaces have a right-angled banding which we would expect to characterize most fluted point preforms.

Fluted-Point Manufacture, Use, Reworking and Recycling

Manufacture

Based on the foregoing sample, it is possible to synthesize some data on fluted point manufacture. Apparently, two different major manufacturing methods were employed. These have been referred to elsewhere as "direct thin flake manufacture" and "serial biface reduction" (Knudson 1973). The former involves the use of a small thin flake blanks not much larger than the intended products. Blanks are afforded a minimum amount of reduction and although often fluted, sometimes only on one face, reduction consisted largely of edging to provide a suitable outline shape in plan view. As a result, products of this manufacturing sequence frequently retain the plano-convex cross-section of the original blank and areas of unaltered original flake blank surfaces such as the one item with a pseudo-flute mentioned earlier. As noted elsewhere (Roosa 1977a:353), because these items are relatively thin with plano-convex cross-sections, they superficially resemble and could be erroneously identified as, Holcombe type points (e.g. Fitting et al. 1966). However, it is clear they are not points of that type based on their recovery in dense areas of Paleo-Indian activity at Parkhill in association with large numbers of typical Barnes points. Also, they differ in outline shape from Holcombe points.

It was suggested above that fluting preparation on points manufactured by the direct thin flake route often involved only unifacial surface preparation prior to fluting attempts rather than preparation of both faces prior to fluting. It seems possible that this is a time saving device; that is, that these blanks were very thin to begin with and perhaps unifacial fluting was all that was required in most instances. Alternatively, because they are so thin, they may break more readily in manufacture. In either case, time would not be wasted carefully preparing a face on which fluting may not be required or which was often going to break in manufacture (see Flenniken 1978). A low frequency of use of this manufacturing alternative is suggested by the fact only four points/preforms represent it in the collection.

The second sequence of point production or serial biface reduction, appears to have been more commonly used and an illustrative sequence is presented on Figure 5.13. In this case, a larger, thicker, flake (or perhaps even a core blank in some instances) was selected. The consistent banding orientation on most Collingwood chert points at right-angles to the longitudinal axis suggest the same kinds of blanks were produced in quantity for this type of reduction. The right-angled banding orientation combined with evidence the platforms were oriented towards one end of the point to be, strongly suggests top-face blanks were used for this purpose. As noted elsewhere (Deller and Ellis 1992b:31; Ellis 1984:161-162), such an interpretation is also supported by the consistent presence of large blade-flakes with little curvature among the top-face blanks made into unifacial tools but not among the types of blanks with different banding orientations. These large top-face blanks would be admirably suited for point blanks. One from the Dixon site is shown here for illustrative purposes (Figure 5.13a).

The reason why the cores used to produce these large flakes were mainly oriented such that the flakes (and subsequently the points) had right-angled banding can be debated and Ellis (1984:308) even went so far elsewhere as to suggest a possible aesthetic reason for this preference. However, having had the opportunity to examine a large series of Collingwood chert quarry blocks from outcrops, it is quite clear that the longest dimension of these blocks with an easy to use striking platform is most often the dimension from top to bottom of the original bed section. Hence, if one wants to maximize point size, and particularly length, this is the way to detach the longest flakes and they would have right-angled banding in comparison to the flake longitudinal axis. Such an explanation would also explain why the long axis of biface cores was also apparently most often in that direction. This idea might also explain why there is much more variation in banding orientation on Barnes type points on Collingwood variant chert from sites like Fisher (Storck 1997) as compared to sites like Thedford II (Deller and Ellis 1992b:45) and Parkhill. It has been demonstrated elsewhere that the Fisher site points are much smaller than those at other sites in terms of width and

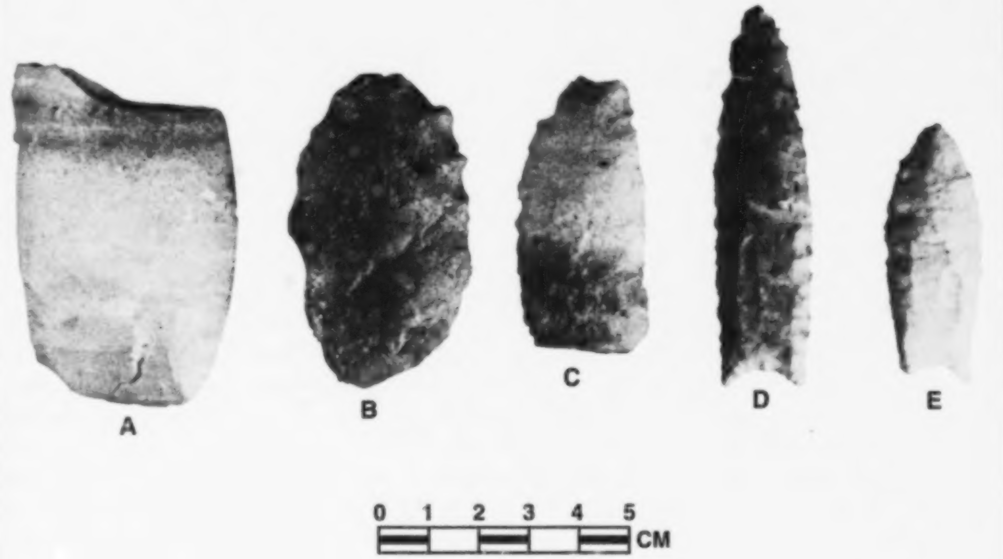


Figure 5.13: Sequence of fluted biface production. a: large top face blank (Dixon site); b: thinning stage preform; c: unfluted finishing stage preform; d: fluted finishing stage preform prior to edge regularization retouch and lateral basal grinding; e: finished and resharpened point.

thickness (Deller and Ellis 1992b:43-45; Storck 1997:268-270) and one presumes, given their diminutive nature, length as well. If one does not want to maximize length, it is possible to use blanks removed from the cores in a broader range of orientations. This explanation would also explain why the apparently shorter Crowfield type fluted points also exhibit more variable banding (Ellis 1984:308-309).

In any case, after large flake blanks were selected they were reduced through a series of progressively more refined, more parallel-sided, thinner, biface forms to a point where preparation for fluting was possible. This reduction removed the original flake blank surfaces and plano-convex cross-sections of the flake. These intermediate stages are represented by the unfluted preforms in the assemblage (Figures 5.12a-c, 5.13b). It was possibly at this juncture that the preforms were intentionally heated to improve flaking qualities. Evidence of the application of this treatment at Parkhill has been presented by Pavlish and Sheppard (1983).

After the thinning was complete, careful surface preparation by a parallel-collateral retouch was begun (e.g. Figure 5.13c). These flakes terminated along the mid-line and the intersection of flake terminations from both edges formed a medial ridge to guide flute removals. It was, in contrast to the direct thin flake manufactured items, carried out on both preform faces prior to any fluting attempts.

Subsequently, tips and bases were prepared for fluting, fluting per se was carried out (Figure 5.13d), edges were regularized by selective marginal retouch, and the lateral basal edges were ground to produce the finished product (Figure 5.13e).

Use

With one exception (Roosa 1977b: Figure 1, upper row, second from left), all finished points exhibit use-damage. Moreover, in all cases, this damage, or other forms of evidence, is either definitive or consistent with use as projectile tips. Excluding the fact there is no evident use wear which could result from other uses such as as knives, positive evidence suggesting use as projectiles is threefold. First, although a few snapped tips and mid-sections are present which might be a product of projectile use, one source of evidence of this form of use is the large number (N=57) of snapped, usually short (mean of 17.4 mm; N=46), basal segments lacking tips (Table 5.1; Figures 5.1i-o, 5.2, 5.3, 5.6g-i). As suggested first by Roberts (1935:121), these bases undoubtedly represent that portion of the tool bound in the haft. The points were broken in use off site as projectile tips and the bases were carried back to the site bound in the haft where they were removed and discarded. These snapped bases occur on Bayport and Onondaga chert, including the items with wider waists noted earlier indicating both sizes of points were used as projectiles. Another source of evidence of projectile use is the presence of distinctive tip impact fractures. These occur on eight of the 22 items with well-preserved tip ends (e.g. Figures 5.1a-b; 5.4b, c, e; 5.5b; 5.6a). Finally, and as will be discussed more below, resharpening evidence is found on several point fore-sections and this evidence consists almost exclusively of resharpening of tips rather than lateral edges of these points. The emphasis on tip resharpening is more consistent with projectile use rather than a use as a knife or other tool.

The remaining forms of use damage are not as definitive of projectile use but at least are consistent with that form of use. Seven of the bases exhibit a burin-like spall removed down one (e.g. Figure 5.1i, 5.2 f-g) or both (e.g. Figure 5.3v) lateral edges from the snap. These breaks do not appear to be a result of reworking and use as burins but instead, seem to be a result of forces produced on impact with a target. Either the base was snapped off and the detached point fore-section crushed or collapsed against the basal segment or the burin-flake was detached first on immediate impact and then the base snapped off subsequently with continuing penetration or movement of the wounded game animal. Certainly there is no evidence the burinated bases were used. Still another form of use damage is ear breakage. Of the 60 points retaining basal segments, 42 or 70% have had one (29) or both (13) ears snapped off. The former could easily be the result of the projectile striking a point obliquely causing one ear of the point to be broken off as it was thrown sideways against the haft. Breakage of both ears could result from force directed straight down the longitudinal axis such that the bottom of the slot or "split-end" shaft (in which they were presumably mounted) was forced against both ears. Presumably, some basal halves or split bases (e.g. Figure 5.3y) are also a product of this kind of impact. Two points, including one with both ears broken off and one missing a single ear (Figure 5.3k), had a spall driven off one basal face, perhaps resulting from contact of base with the haft as the weapon hit an object.

Reworking

A distinction is made here between

reworking which represents attempts to make damaged points serviceable for use once again as projectile tips and recycling, in which the points were altered to serve other uses. The most common evidence of reworking is tip resharpening. Excepting one long tip segment lacking flutes (Figure 5.4a), all tip ends have been resharpened. This conclusion is based on abrupt changes in outline, thickness and flaking pattern towards the distal or pointed end which usually is indicative of this form of reworking. As noted earlier, in no cases does this reworking extend much down the lateral edges from the tip. This feature indicates resharpening was directed towards producing a serviceable tip rather than to resharpen lateral edges dulled by some other, non-projectile use. In turn, this tip resharpening emphasis suggests major differences in point use patterns between the fluted forms and later Hi-Lo and other Dalton-like lanceolate forms which often have extensive resharpening of the lateral edges (e.g. Ellis and Deller 1982; Goodyear 1982:383). In two cases, the tip resharpening at Parkhill was clearly to correct damage caused by tip impacts as parts of such damage are still visible (Figure 5.1a). These interpretations of projectile tip use do not mean that Barnes points were not recycled into other uses after serving as projectile components. They were certainly recycled in this manner as we will discuss below. However, in their primary initial form as hafted tools, they seem to have served largely, if not exclusively, as projectiles. Accepting this interpretation, several items with basal reworking for rehafting purposes probably also represent attempts to once again make a basally damaged point serviceable as a projectile tip.

One of the basally reworked points (Figures 5.5d, 5.6f) has a remnant of a slight snap across the base. Subsequent to this snap, a new concavity was produced at the base. The lateral basal edges were also extensively reworked resulting in some basal narrowing and a distinct break in outline (almost a stem) in comparison to areas more towards the point fore-section. This reworking of the lateral basal edges appears to have been necessary because the lateral edges of Barnes points expand from the base towards the fore-section of the point. Hence, if the base is snapped off transversely and a new concavity is produced without narrowing, a wider point base would result. Although the specific factors governing basal width are obscure, as noted in earlier discussions, basal and waist width vary less than other continuous point variables except for face-angle. Basal and waist width are apparently more tightly constrained due to requirements of hafting. Thus, wider bases may have been difficult to haft and so, some reduction in base width on snapped point bases was necessary in order to fit the base into a haft (see Figure 5.14a-d), much in the manner seen in the reworking for rehafting on another Paleo-Indian tool form, the flake shaver (see Grimes and Grimes 1985: Figure 2). It would seem that on the specific point being considered here, the reworking was unsuccessful (as it has not been reground on the lateral basal edges on one side) and it was abandoned. However, three other points are suggestive of successful reworking of this nature.

Two of these points are represented by short, snapped bases most likely broken off in projectile use (Figures 5.5f-g; 5.6g). Both contrast with the majority of points in several ways. Basal concavities are quite shallow (under 2 mm) and very roughly retouched. The apex of the concavities is thick and abrupt and somewhat irregular. The points also lack the commonly found fishtails as well as the well-formed ears seen on other bases in the collection. In one case (Figure 5.5f), remnants of

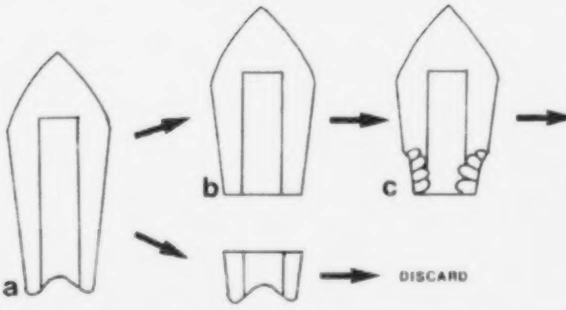


Figure 5.14: Reworking of point fore-section bases to maintain basal width. Characteristics are exaggerated for clarity of presentation.

basal breakage (e.g. a snap surface) is present near one corner, only partially obscured by subsequent reworking retouch. Both of these point bases also exhibit evidence of extensive lateral reworking to narrow the base. It consists of a rough retouch which extends over and envelops the base of the flute scar on one face (e.g. Figure 5.6g). This form of retouch invading the lateral flute edges is unique to these two point bases. In one case (Figure 5.6g), enough of the base is present to indicate it became slightly stemmed by the lateral reworking. Clearly, both these points suffered basal damage. They were reworked by the formation of a new, rough but serviceable basal concavity and by narrowing and regrinding of the lateral basal edges for rehafting. A third point suggestive of this form of reworking is a large, tip-impacted, distal end (Figure 5.4c). This point appears slightly stemmed, perhaps as a result of the narrowing process.

Another point with clear attempts at basal reworking had at least one ear snapped off in use (Figures 5.5e, 5.6e). The knapper then apparently attempted to rethin or reflute the point on one face and a markedly offset thinning flake was removed along one lateral edge. As part of the rethinning attempt, the tip was deliberately narrowed as in the manner of the preform tips discussed earlier -- a narrowing suggestive of the use of a holding device for fluting.

The reasons for the attempts at rethinning of this item are obscure. It may have been necessary because the point is thickest towards mid-point and was short fluted to begin with on the altered face. Therefore, after basal breakage, the position of maximum thickness would be moved closer to the base. This added thickness might have prohibited the replacement of the point in its haft without additional thinning attempts. If this scenario is accepted, it suggests explanations for two other aspects of the fluted point samples.

First, as noted above, at both the Thedford II and Parkhill sites most of the relatively complete discarded points are poorly or short fluted compared to incomplete discarded items. Roosa (1977b:96-98; Roosa and Deller 1982:9-10) has suggested such a correlation is indicative of use-variability within the fluted points -- that somehow different uses required different kinds of hafting. For one short fluted point from Parkhill (Roosa 1977b: Figure 1, upper row, second from right) lacking any evidence of basal damage in use, such is a viable explanation although of course, this single example might represent a simple loss. However, in other cases, all exhibit some form of basal damage even if it is something as simple as a broken ear (e.g. Figures 5.1c, d, f). If the interpretation of the refluting attempt given above is valid, then this suggests an alternative, and one of us (Ellis) believes a much more likely, explanation for the short flutes on several relatively complete points. By virtue of the short flutes, these points are thicker closer to the base than the other items. If the base is damaged, these items would be more likely to be too thick which would prohibit rehafting. This problem would be difficult to correct as new fluting attempts would tend to hinge out short at the hinge termination of the previous short flute. As a result, it would be difficult to lengthen existing flute surfaces or to additionally thin the base for rehafting. Thus, one would expect a greater tendency for relatively complete points with basal damage to be short fluted as they could not be successfully reworked. Discard rather than reworking is the more viable alternative.

A second implication of the refluting attempt is that it suggests an explanation for the desired norm of full or at least longer fluting found in Barnes as well as other types such as Folsom points. The long fluting of Folsom points in contrast to the short fluting on Clovis points is often interpreted to indicate a large section of the former type was encased in a slot in a haft end (e.g. Crabtree 1966:7, 27). However, the fact such points often snap near the base suggests this interpretation is in error. Also, these points are often resharpened to a very short form which would be impossible if the point was fully encased in a slot end haft. Hence, it is possible that longer fluting was desired because if the base broke off, the point could be more easily repaired by simply chipping a new basal concavity. This procedure would obviate the need for additional thinning to accomplish successful rehafting. This simple basal reworking is well-documented in Folsom (Wilmsen and Roberts 1978: Figure 46) and, as noted above, does occur on Barnes points.

A final point with basal reworking had both ears snapped off (Figure 5.1f). Subsequent to this breakage, the snap at one corner was partially obscured by basal retouch. It is possible that the knapper began to shape a new base but then abandoned the attempt. Presumably this abandonment occurred because the item was initially short-fluted and in addition, had a material flaw near mid-point. Both of these problems contributed to an abrupt two mm increase in thickness just above the base. Again, this thickness would make the point difficult to rework as well as rehaft.

Recycling

Three fluted points and three bifaces unassignable to the point or preform category exhibit evidence of recycling into other uses. Of the points, one is relatively complete, lacks an ear, and is in two pieces having been snapped transversely near the tip (Figure 5.5a). Comparison of the edge outline between the tip and large basal segment indicates one lateral edge of the latter has been modified by bifacial retouch since the break. It is possible that this was an item abandoned in the reworking process but the fine character of the retouch and its restriction to the lateral edge suggests it is more likely the edge was modified for use as a cutting tool. The other two finished points are represented by large tip segments (Figure 5.5b-c). These represent the fluted point "blades" of Roosa (1977b:105). In both cases, after a transverse snap one lateral edge has been modified which obscured part of the snap surface. On one of these items (Figure 5.5c) this recycling resulted in a major asymmetry in outline shape between the recycled and unrecycled edge. Moreover, the juncture of the recycled edge and the snap was rounded in plan. Fluted bifaces with a similar recycling to this latter item (although occurring on fluted preforms) are reported from the Thedford II

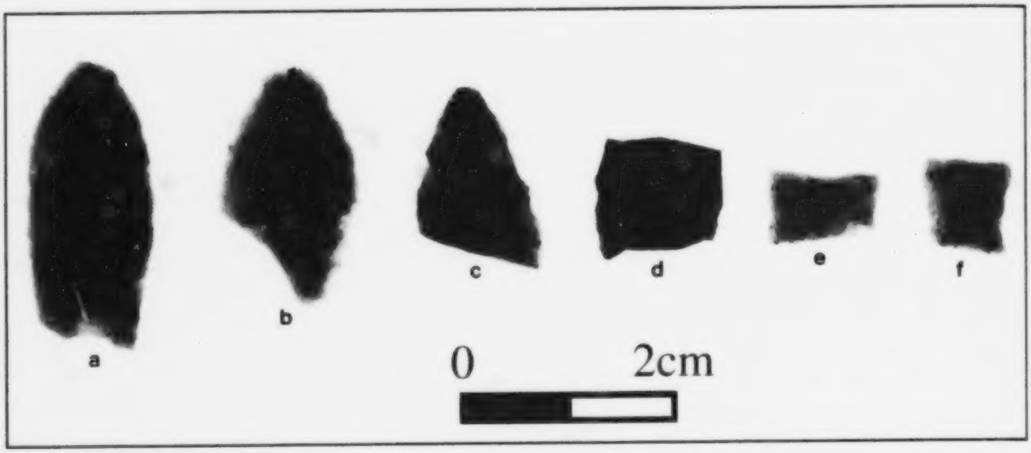


Figure 5.15: Channel flake points. a-b: relatively complete; c: tip; d-f: mid-sections and bases.

(Deller and Ellis 1992b: Figure 22j) and Barnes (Wright and Roosa 1966:856) sites. Roosa and Deller (1982) have suggested this recycling involved rehafting of the tip segments in a slot. This interpretation is certainly possible but there is no clear evidence.

Of the other recycled fluted bifaces, one is a fluted point blade (Figure 5.5k) similar to the two finished points just described. Both lateral margins have been modified such that part of the snaps at both ends were obscured. This item is so short that it is clear the lateral modifications were not to rework the point for reuse in that manner but instead were to use if for a totally unrelated function such as as a cutting tool. A second item is a large tip segment (Figure 5.5i). A piercer or spur has been flaked by an alternate retouch into the distal end. The lateral edges may have been modified in a manner analogous to that on the previously described item. Another recycled biface (Figure 5.5j, 5.6d) is probably on a tip segment. Excepting a small area near the base, all margins have been finely retouched bifacially to form a small tool with a somewhat "tear-drop" shaped outline. It seems probable that this item is a much more used and resharpened version of the recycled blades. Two fore-sections with rounded corners which may have been recycled in a very similar manner have been reported from the Parkhill Phase Fisher site (Storck 1997: Plate 3.9f, 3.9g).

We must also mention that a "rod-like" biface with an expanding base was recovered from Parkhill (Figure 5.5h). Although there might be a flute remnant on the base of one face (this interpretation can be debated), it was recovered as an isolated find much removed from the concentrations of Paleo-Indian materials, can not be said to be made on a material diagnostic of the Paleo-Indian occupation of the site (e.g. Collingwood chert) and even seems to have notch remnants. It could have been recycled by later site occupants. Indeed, Early Woodland materials occur near the find and it resembles the kind of "drills" this later group produced. In any case, as Roosa (1980:16) has noted, this item resembles the final stage points or skewers reported from the Dalton complex to the south (see Goodyear

Table 5.12: Channel Flake Point Data (measurements in mm).

Catalogue #	Site Area	Condition	Length	Width	Thick-ness	Basal Thinning
128	B	Tip end	-	12.0	2.3	-
137	B	Complete	22.4+	13.5	2.8	7.7+
148	B	Mid-section	-	-	2.2	-
165	B	Mid-section	-	-	2.5	-
365	D	Complete	27.0	12.4	2.5	5.6
392	D	Mid-section	-	12.4	2.3	-

1974:30; Morse 1976:162). As with the Dalton items, the specimen reported here does not appear to have been used as a drill. It is certainly not a blunt-bitted twist drill such as those commonly reported from fluted point sites to the east of the Great Lakes in the New England-Maritimes region (e.g. Byers 1959; Gramly 1982; MacDonald 1968) because of its narrow, pointed tip end. Moreover, unlike the drills on the sites to the east, the Parkhill item was apparently made by recycling from a point rather than originally being intended for use as a rod-like biface. Since we are uncertain as to the Paleo-Indian provenance of this item, it is not included in the artifact totals from the site.

Channel Flake Points

A distinctive tool form found on many fluted point sites where long fluting was practiced, is small points made on channel flakes (see Tunnell 1977:152). Six of these items are in the Parkhill collections (Figure 5.15; Table 5.12) which have been described in detail elsewhere (Ellis 1994a). Two are tips, three are mid-sections and one is relatively complete. On the incomplete items all the break surfaces appear to be fresh and a product of recent events such as site ploughing or breakage during screening.

The specimens retaining tips all have remnants of the isolated platform used for fluting. The makers at Parkhill and elsewhere (e.g. Deller and Ellis 1992b:51) consistently availed themselves of this naturally pointed end to serve as the tip. After a channel flake base was selected, it was formed into a point by the application of a short, marginal, bifacial retouch to refine lateral outline shape and to produce a slight basal concavity. The one complete item here has a short (3.1 mm) basal thinning on the convex face while another has the tip of what is apparently an actual miniature flute. Basal edges have light lateral grinding. This grinding, along with the basal thinning and concavity suggests they were hafted in tiny shafts. In terms of outline shape, these items mimic closely the regular Barnes fluted point in the assemblage. For example, they have lateral edges which expand slightly from the base to around mid-point and at least one item (Figure 5.15) had a fishtail. Roosa (1977b:107) and others (see Tunnell 1977:152) have suggested these items were "toys" whereas Ellis (1994a) has argued elsewhere that the Parkhill items were more likely amulets of some kind used in ritual contexts.

Large Alternately Bevelled Bifaces

This distinctive biface tool form which was first noted in the Parkhill site collections (Deller 1980), has been subsequently reported from a number of other sites such as Thedford II (Deller and Ellis 1992b:48-49; Ellis and Deller 1988:113-114), Dixon (Deller and Ellis 1992a:31) and Crowfield (Deller and Ellis 1984:46) and items with bevelling on just one edge have also been reported from Ontario sites (e.g. Storck 1997: Figure 3.11a). In fact, large bevelled biface tools were reported from Folsom Paleo-Indian sites in western North America as long ago as the 1930's (Roberts 1935:24-25). The complete Crowfield sites examples have basal lateral grinding suggesting such tools were hafted. Although usually represented only by fragments, they were initially quite large being wide and very thin with broad, flat thinning flake scars covering the surfaces. At one end the tips have been alternately bevelled by continuous unifacial resharpening. Usually, as is the case with the items here, the bevel appears in plan on the left edge when viewed with the tip pointed away from the viewer -- a trait which may be due to the handedness of the user.

The three fragments of such tools from Parkhill include two tips and a mid-section fragment (Figure 5.16a-c; Table 5.13) broken by transverse snaps. As is often the case, probably because the tools and resulting broken segments are large and easy to manipulate, two of these tools (the tip segments) have been recycled. Both exhibit extensive retouch across the snap surfaces. In one instance, such retouch originates at the juncture of the snap with both faces and has obscured most of the old snap surface. This tool also exhibits a pronounced, alternately retouched spur or borer on one lateral edge near the old snap. The two Collingwood bifaces in the Parkhill assemblage exhibit banding at right-angles to the tool's longitudinal axis. This characteristic, combined with their large size, suggests they may be made on the nuclei of large biface cores which as argued in Chapter 4, had right-angled chert banding.

Small Alternately Bevelled Bifaces

This tool type, first recognized in the unreported Crowfield site collections, is represented by a tip fragment and a basal segment (Figures 5.16d-e). As with the preceding type, these tools exhibit a unifacially produced alternate bevel. However, here the similarity with the other bevelled bifaces ends. First, these tools are much smaller (compare Tables 5.13 and 5.14). Second, they are parallel-sided. Third, the bevel appears on the right edge in plan. Fourth, even in a resharpened condition, they exhibit a rounded tip (i.e. Figure 5.16d). Finally, the basal segment indicates the bevel is not restricted to the tip end but extends all the way to the base of the tool. These contrasts suggest they are a distinct, previously unrecognized, tool type.

Backed Bifaces

A complete representative and a mid-section fragment of this distinctive tool type are in the Parkhill site collections (Table 5.15). Such tools occur on other Parkhill Phase sites such as Thedford II (Deller and Ellis 1992b:50), Dixon (Deller and Ellis 1992a:31) and F. Wight (Deller 1979: Figure 6-12a; Deller and Ellis 1992a:31). They are also known from the Crowfield Phase as represented at the Crowfield site (Deller and Ellis 1984:46).

a
b
c
d
e
f
0
2cm

Figure 5.16: Miscellaneous biface tools. a-b: large alternately bevelled biface tips; c: large alternately bevelled biface mid-section; d-e: small bevelled biface fragments; f: backed biface. Arrow shows location of basal notch. Apparent notch at lower right of f is a recent break, probably from plough damage.

Table 5.13: Large Alternately Bevelled Biface Data.*

FC #	Condition	Raw Material	Width	Thickness	Width/ Thickness Ratio	Bevel Angle Reverse	Bevel Angle Obverse
330	Tip	Collingwood	46.0	7.5	7.6	50-75°	55-80°
325	Tip	Collingwood	-	6.5	-	55-65°	50-65°
881	Mid-Section	Onondaga	40.5	5.4	7.5	55-65°	-

*FC#: Field Catalogue Number; measurements in mm except edge angles.

Table 5.14: Small Alternately Bevelled Bifaces.

FC #	Condition	Raw Material	Width	Thickness	Width/ Thickness Ratio	Bevel Angle Reverse	Bevel Angle Obverse
503	Tip	Collingwood	14.2	3.9	3.6	45-50°	45-50°
192	Base	Collingwood	12.5	5.0	2.5	45-60°	50-55°

Table 5.15: Backed Biface Data.

FC #	Condition	Raw Material	Length	Width	Thickness	Back Length	Back Width	Edge Angle
503	Complete	Collingwood	71.5	31.0	10.5	45.0	8.5	35-45°
192	Mid-section	Collingwood	-	23.9	7.5	-	7.7	50-55°

This tool type has been described in detail elsewhere (Ellis and Deller 1988:114-115). As the type name implies, these bifaces have a "backing" or right-angled surface along one lateral edge. They are not backed in the normal sense, the back being a flat surface or natural back rather than one formed by steep retouch. The flat back surface is used as a striking platform to remove thinning flakes over the biface surface. Usually on Parkhill Phase examples, such thinning occurs on both faces. However, the complete example shown here (Figure 5.16f) only has such thinning on one face. Other than the backed edge, the margins of these tools are thin and bifacially flaked and form a pointed to rounded tip at one end and a base which is somewhat blunted in plan at the other end. A distinctive characteristic of Parkhill Phase tools of this type as compared to the known Crowfield Phase examples, is the presence of a tool accessory in the form of one or more notches or concavities near the base.

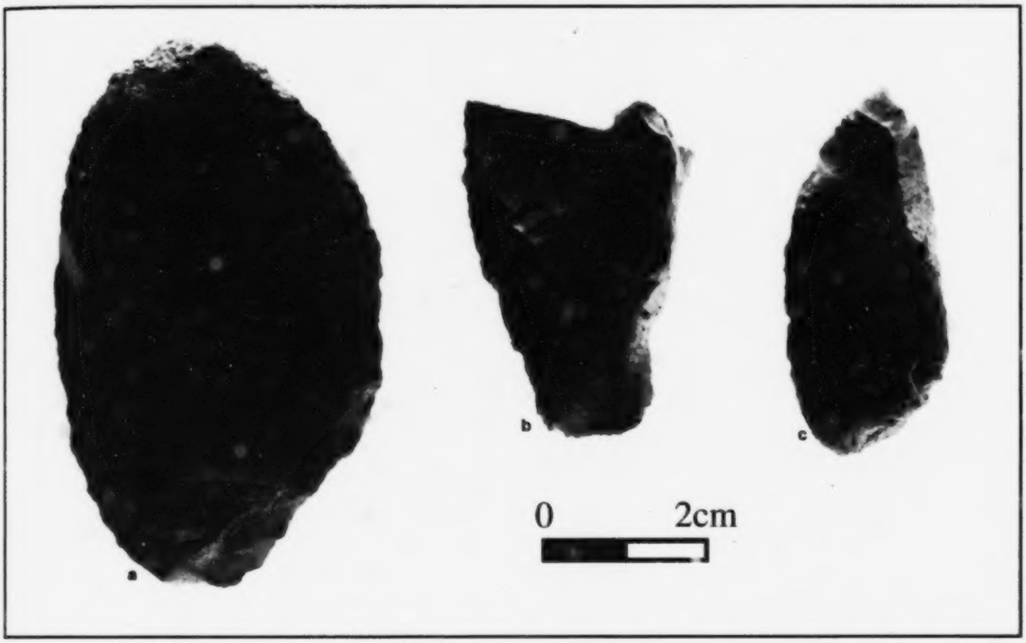


Figure 5.17: Marginally retouched bifaces.

One concavity is definitely present in the centre of the base on the complete item from Parkhill although it has been somewhat obscured by plough damage at both basal corners which even included the production of a pseudo-notch adjacent to the thin retouched edge.

Other Bifaces

Excluding four small edge fragments, there are three other bifacial tools in the collections (Table 5.16). All of these are marginally retouched and still possess extensive unworked surfaces of the original flake blank. One (Figure 5.17b; Field Catalogue #378) is on an unknown blank form and although incomplete, exhibits a fine bifacial retouch along one convex lateral edge. The other lateral edge is very steeply unifacially retouched perhaps to form a backing to hold or haft the tools.

The remaining tools are both made on top-face blanks. One (Figure 5.17a; Field Catalogue #1129) is on a large blank of this nature which is a primary flake as defined earlier. Besides a fine, marginal retouch, one end has been extensively bifacially thinned which somewhat narrowed that end and reduced a thickened bulbar area. This thinning suggests the tool may have been hafted. The final tool (Figure 5.17c; Field Catalogue #218) is somewhat oval in outline. It is marginally bifacially retouched along about 3/4's of one lateral edge. This retouch extends slightly around one end onto the opposite edge to form a pointed tip. The remainder of the opposite edge is unifacially, inversely, retouched. An

Table 5.16: Marginally Retouched Bifaces.

FC#	Raw Material	Length	Width	Thickness	Retouched Edge Angle
378 ("Backed")	Collingwood	-	28.8	12.2	40-50°
218 ("Mungai")	Collingwood	44.8	19.3	7.2	45-55°
1129	Collingwood	65.3	40.0	8.3	35-50°

almost identical tool to this one was recovered from the Gainey site in Michigan (Simons et al. 1984: Figure 9b). These tools appear very similar, if not identical, to those items referred to as "Mungai knives" at Meadowcroft Rockshelter (Adovasio et al. 1983: Figures 13.7a, 13.9a).

CHAPTER 6

UNIFACIAL TOOLS

End Scrapers

Some 62 items provide information on this general tool class. The distribution of these items and other unifacial and marginally retouched biface tools by blank types is given on Table 4.22. There is considerable morphological variation in this class which apparently indicates variability in hafting methods, degree of resharpening, use, recycling, and other considerations. This variability is generally patterned and allows the recognition of several end scraper types, all of which have been recognized in previous analyses of Parkhill Phase assemblages (e.g. Deller and Ellis 1992b; Ellis 1984; Ellis and Deller 1988). The characteristics of these end scraper forms are summarized by variables rather than types on the accompanying tables to allow easy comparison (Tables 6.1-6.9). In addition, a number of boxplots comparing the variables for major characteristics are included to display the contrasts between types visually (Figures 6.1-6.8). Appendix B lists the field catalogue number for all illustrated unifacial tools and Appendix C provides the measurements for each individual item.

Trianguloid End Scrapers

Thirty-one items provide information on this widely recognized type (Figures 6.9, 6.10, 6.11d). This type is the best represented of all the unifacial forms and only fluted points represent a more common tool type at the site. In fact, the trianguloid end scraper sample from Parkhill represents one of the largest available from an Ontario site. Some of these tools have been recycled into other uses subsequent to their use as trianguloid end scrapers (Figure 6.10). As noted earlier, data on these recycled tools is included here where it can provide information on trianguloid end scrapers themselves. As is the case at other sites such as Vail (Gramly 1982:35) and Thedford II (Deller and Ellis 1992b:197), of blanks assignable to specific types most (47.4%) of these tools are made on large flakes from biface cores. However, including blanks of unknown types, the overall percentage on blanks from biface cores is relatively low (29.0%; see Table 4.22). The sample includes: 26 relatively complete and intact items (although eight of these artifacts have been subsequently modified to various degrees by recycling); one complete item in two pieces which was snapped distally in use and then, the proximal end was recycled by making a narrow end scraper bit on the right lateral edge (Figure 6.10g); a lateral half produced by a recent, probably plough-induced, fracture; and five snapped bit ends broken in antiquity, the proximal portions of which were not recovered.

As the type name implies, these tools are roughly triangular in plan shape and have a well-centered convex working edge at the distal blank end. The degree of convexity of the bits varies considerably but this variation is demonstrated below to be due to the degree of resharpening. Measured by bit width to depth ratios, the trianguloid forms have relatively high ratios suggesting relatively wide and flat bits versus other types (Table 6.8; Figure 6.4). Most tools exhibit a slight to moderate (ca. 9-13 in the method of measurement), usually symmetrical (78.3%), curvature. Of the 26 on which lateral

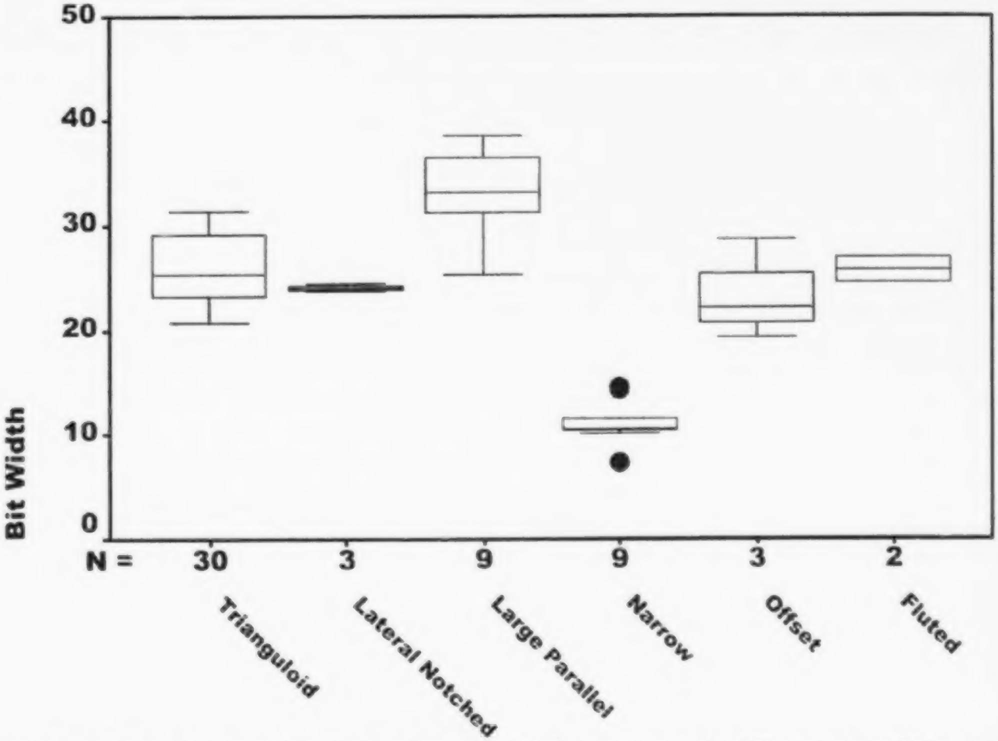


Figure 6.1: Bit width (in mm) boxplots, end scrapers. The box represents the 25th (lower) and 75th (upper) percentiles (Tukey's hinges) and is crossed by a line showing the median. Outliers, or cases with values 1.5 to 3 box lengths beyond the 25th and 75th percentiles, are indicated with a black dot and extreme values beyond 3 box-lengths are indicated, when present, by a square. The lines extending from the boxes (whiskers) show the range of values which are not outliers or extreme values.

edges are observable, 25 have some form of modification of these edges. In 24 cases this modification occurs on both lateral edges but in the remaining instance it only occurs on one lateral edge. Excluding tools accessories such as lateral spurs and notches and a few other exceptions to be described below, this lateral modification is relatively short (ca. 5.5 mm average edge thickness) in comparison to the bit retouch and is usually continuous along an edge. However, two items have had one lateral edge shaped by a deliberate "burin-like" blow (Figure 6.9f) and a third has also had a burin-like blow as well as some subsequent edge retouch along one edge (Figure 6.9o). The edge in all three cases was removed by a blow directed at the platform area which removed a spall along a tool margin. This burin-like modification, as well as the simple retouch found on most items, results in straight, tapered edges near the proximal end which expand at a quite consistent angle from the platform of about 35 to 45° (Figure 6.12).

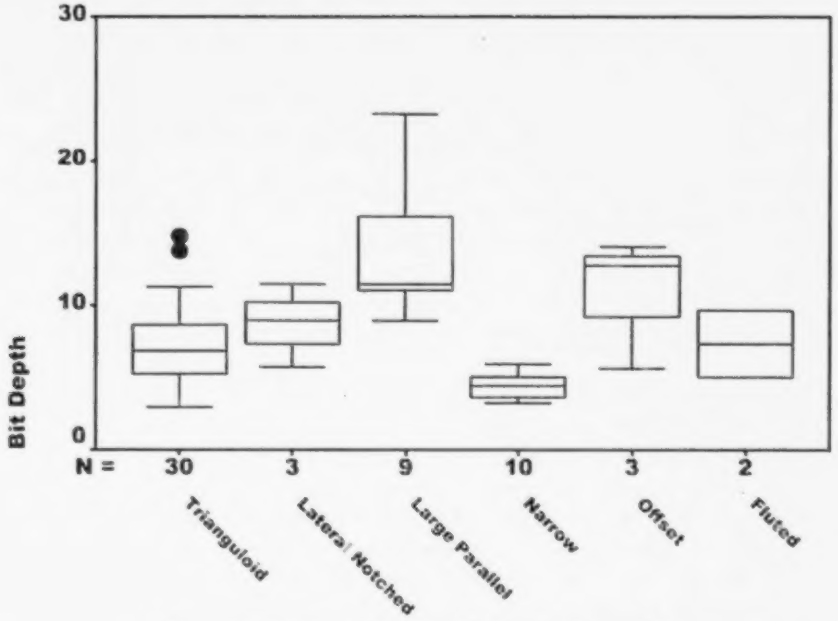


Figure 6.2: Bit depth boxplots. For key see Figure 6.1.

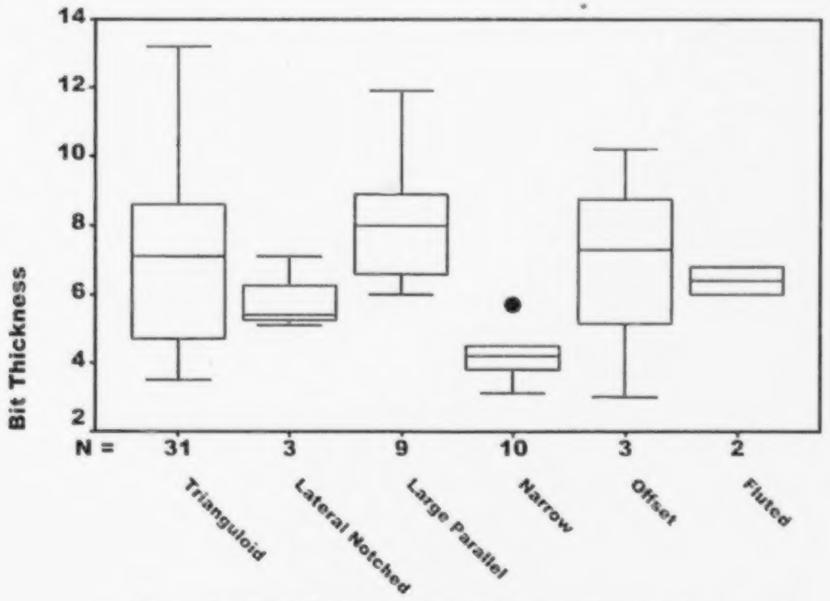


Figure 6.3: Bit thickness boxplots. For key see Figure 6.1.

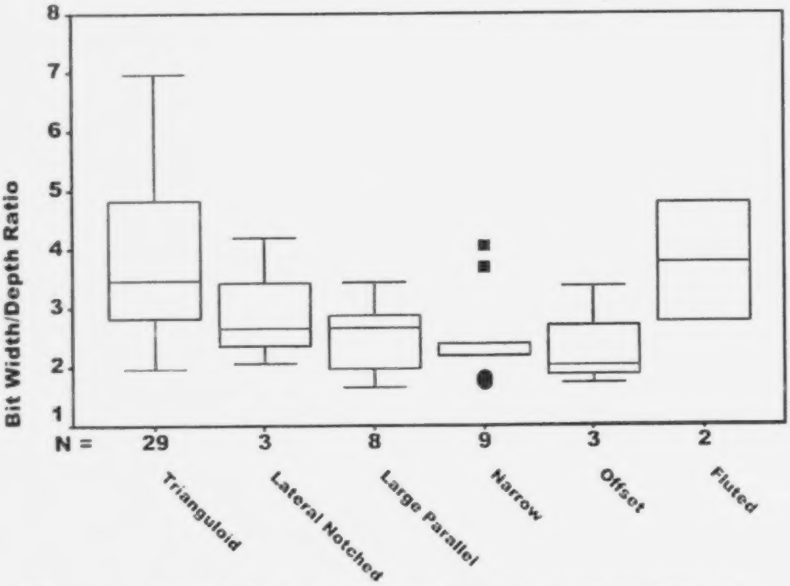


Figure 6.4: Bit width/depth boxplots, end scrapers. For key see Figure 6.1.

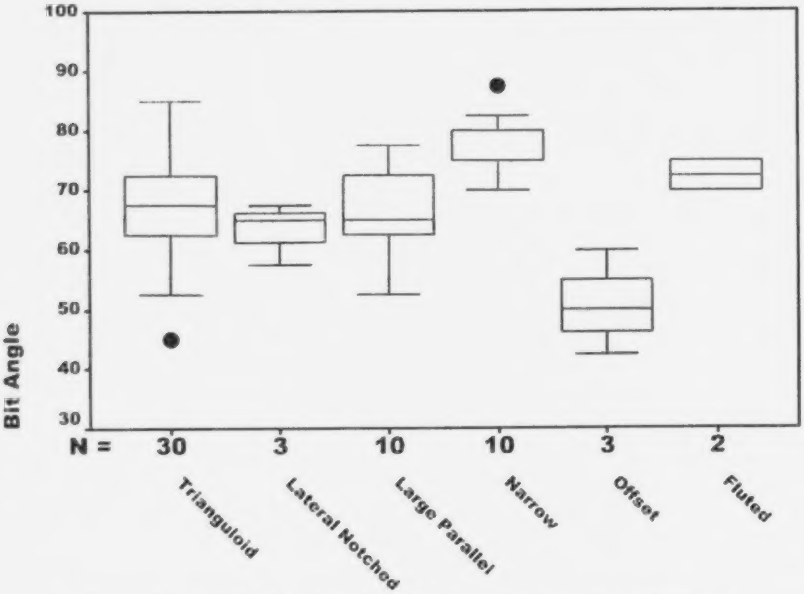


Figure 6.5: Bit angle boxplots, end scrapers. For key see Figure 6.1.

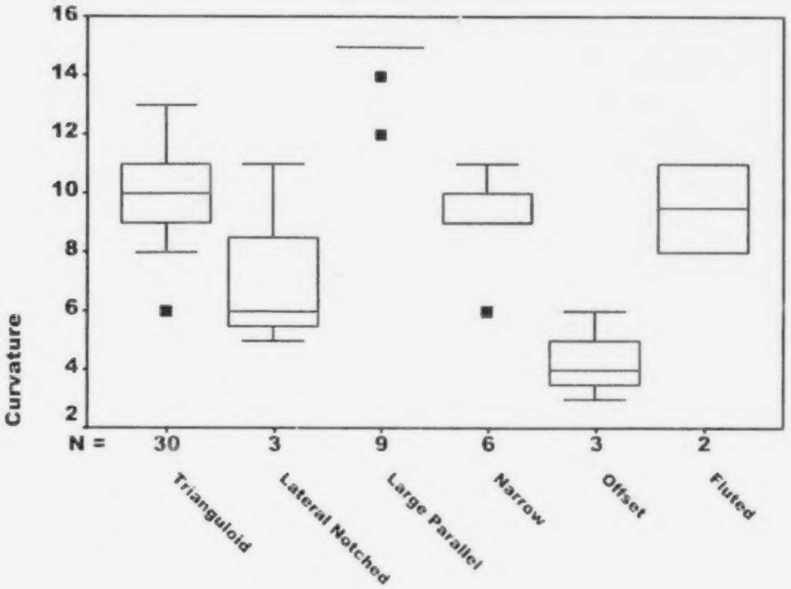


Figure 6.6: Curvature boxplots, end scrapers. For key see Figure 6.1.

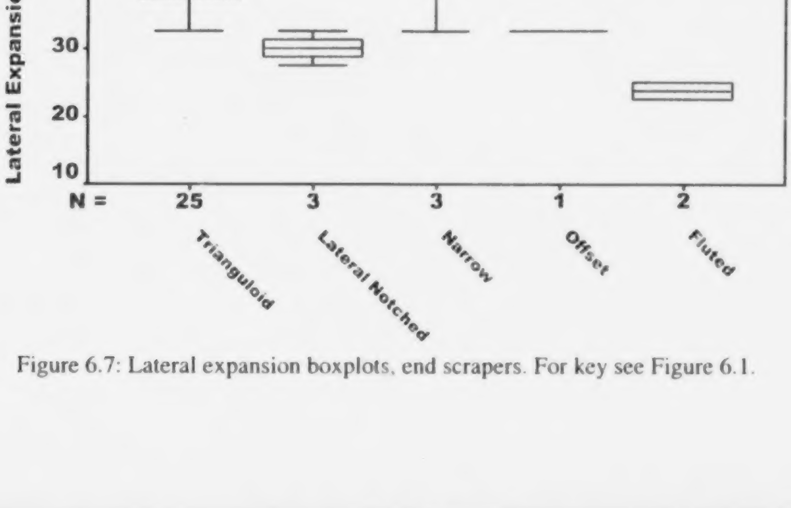


Figure 6.7: Lateral expansion boxplots, end scrapers. For key see Figure 6.1.

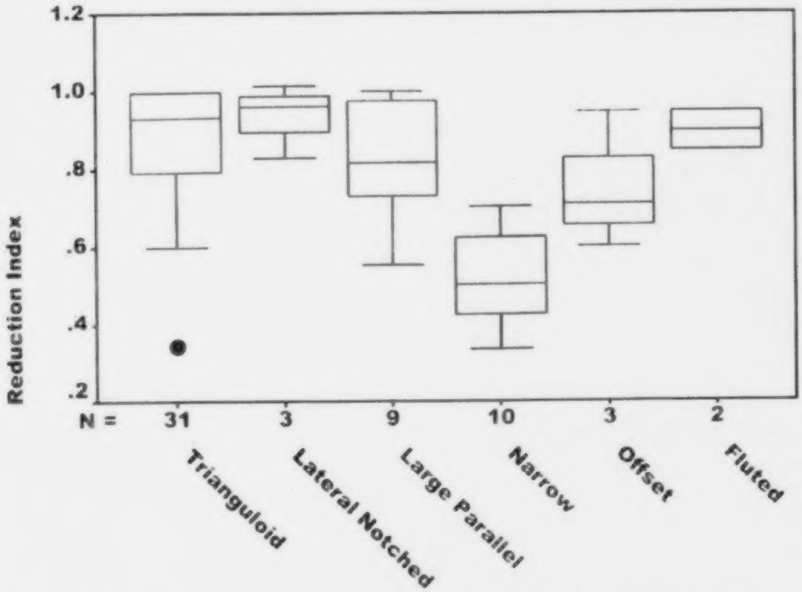
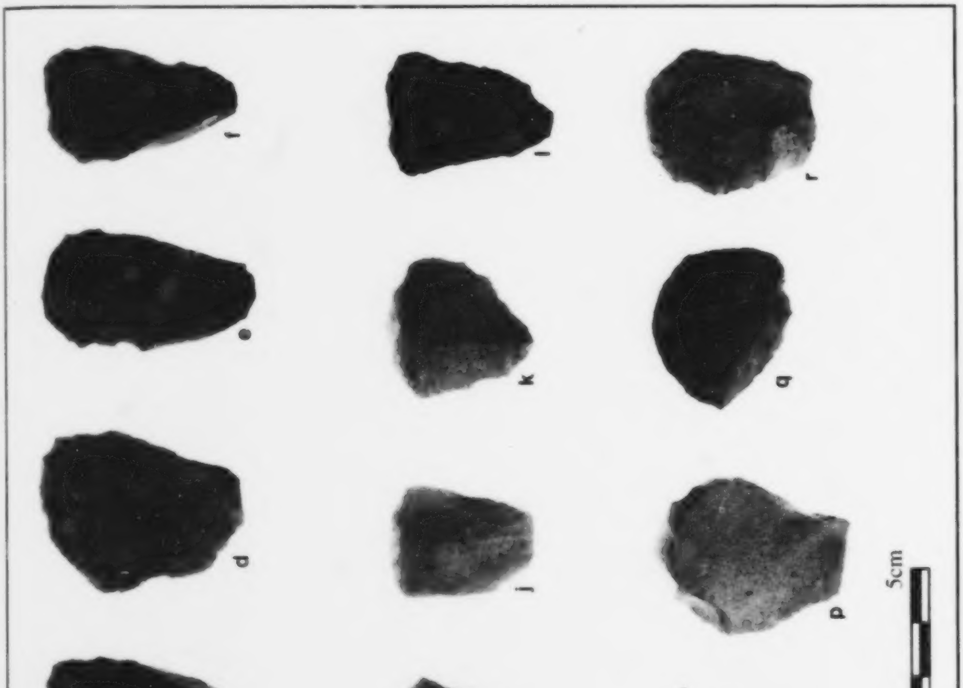


Figure 6.8: Reduction index boxplots, end scrapers. Ratio of bit thickness to overall blank thickness. For key see Figure 6.1.

All of these lateral modifications are suggested to be for shaping purposes rather than to create working edges. Presumably, the straightening of proximal lateral edges and the consistent divergence angles indicates the lateral edges were encompassed in a socket haft. There are however, five items in which the side retouch was not applied solely to shape proximal lateral outline but also thickness at the haft end. In these instances (e.g. Figures 6.9a-c, 6.10a), the lateral retouch at the immediate proximal end is quite extensive. It extends over the mid-line from one or both lateral edges and considerably thins the proximal end. One of these tools also has extensive ventral proximal retouch. This more extensive retouch tends to occur on thicker blanks (Table 6.10) and clearly represents an attempt to thin the tools for hafting. It is notable that this form of modification does not occur on items made on large flakes from biface cores. Flakes from bifaces cores tend to be thin to begin with and thus, there is no or little need for extensive thinning. Indeed, flakes from biface cores are probably favoured for trianguloid end scraper production at many sites because they are thin and naturally expand from the platform. As a result, they need relatively little secondary modification for hafting purposes.

Other suggestions of hafting are some bulb and platform trimming found on six additional items (only one of these is on a flake from a biface core -- again probably because this blank form is thin to begin with, has less pronounced bulbs, and does not need such trimming), the consistent placement of tool accessories (see below) near the bit ends where they would be exposed for use and the presence of several snapped bits. With regard to the latter,


a
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c
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i
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Figure 6.9: Trianguloid end scrapers. Arrow shows uniface retouch flake refitted onto bit of end scraper.

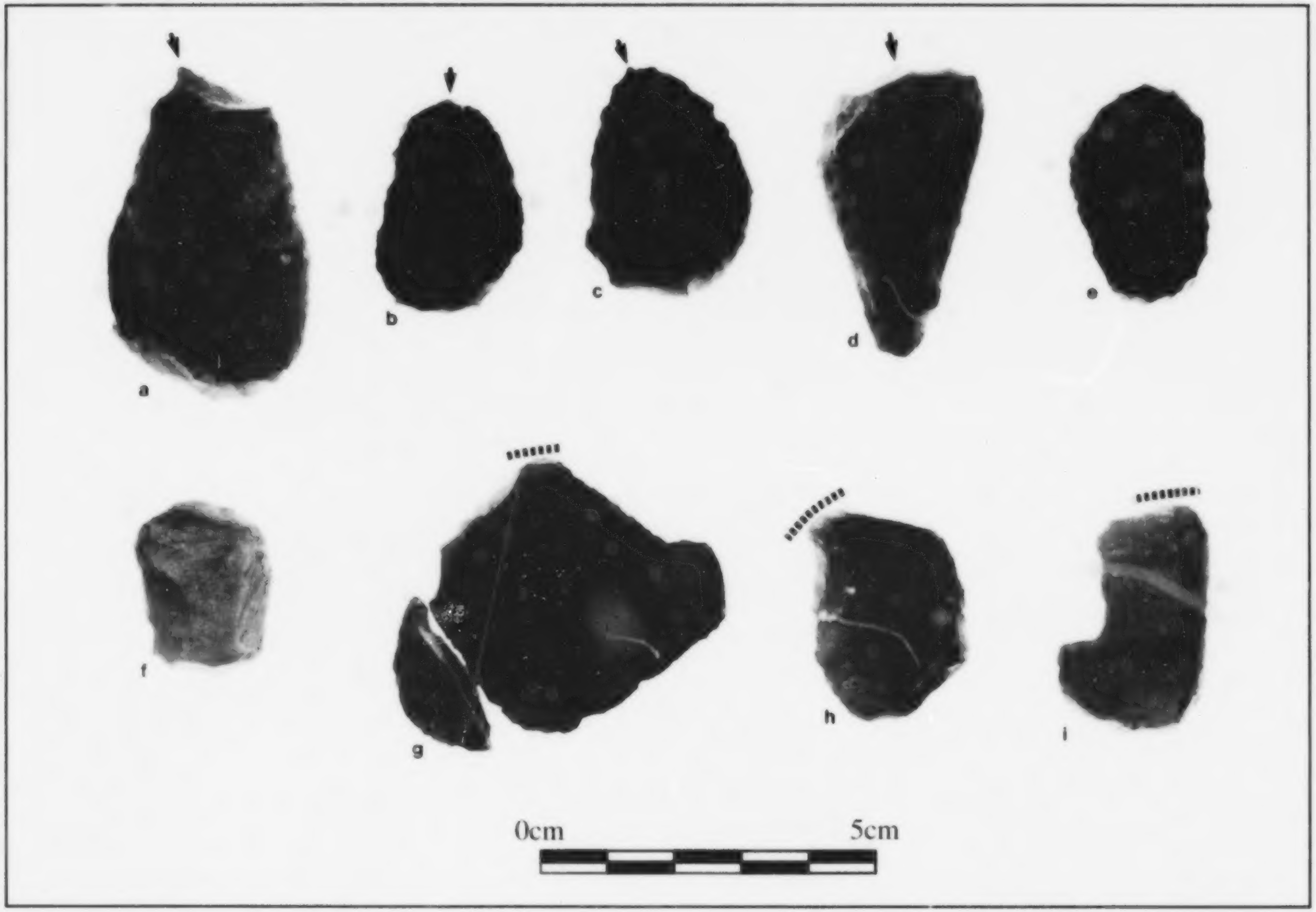

Figure 6.10: Recycled trianguloid end scrapers. a-c: gravers or piercers at proximal end; d: graver or piercer in centre of bit; e-f: end scraper bit added at proximal end (e.g. bi-bitted); g: end scraper with snapped bit and narrow end scraper placed on right lateral edge; h-i: narrow end scrapers placed at proximal end. Arrows show spurs and dashed lines show location of narrow end scraper bits.

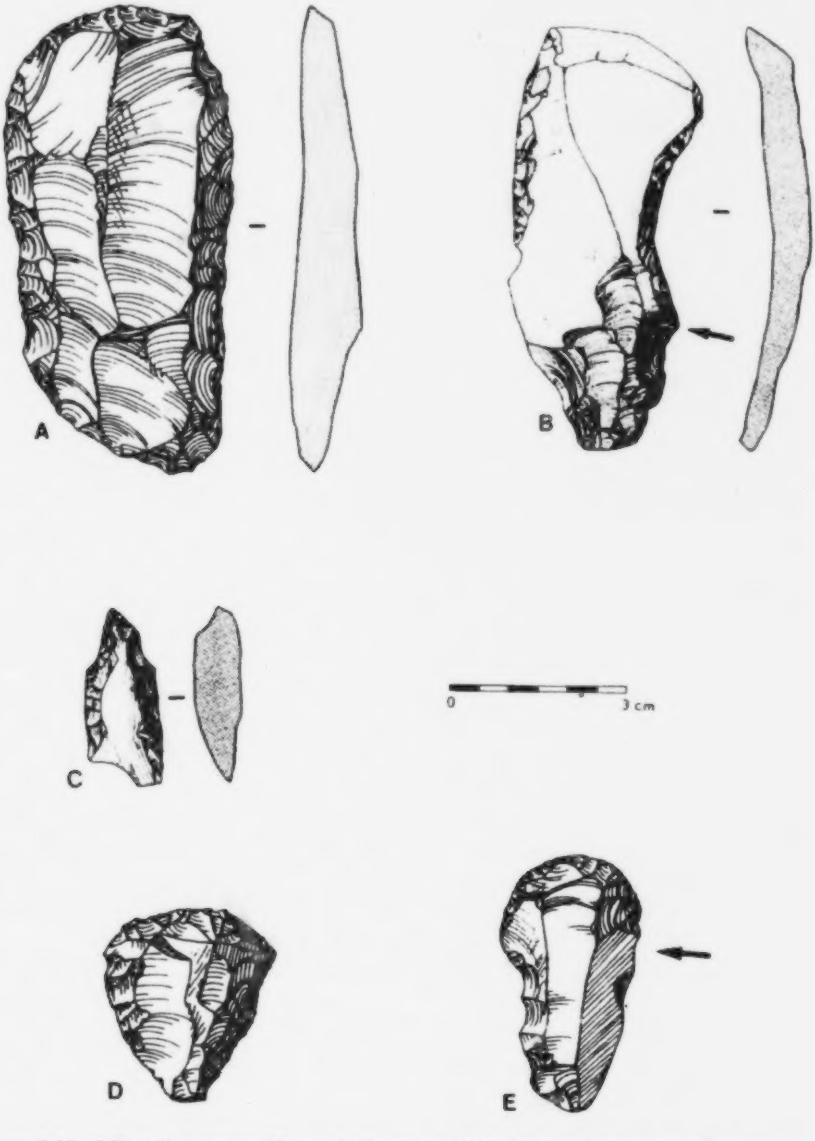

Figure 6.11: Miscellaneous unifaces. A: large parallel-sided end scraper on Bayport chert "blade-flake"; B: Double concave-convex side scraper with spur on Bayport chert "blade-flake"; C: hafted perforator; D: trianguloid end scraper; E: laterally-notched end scraper - arrow shows location of inverse notch.

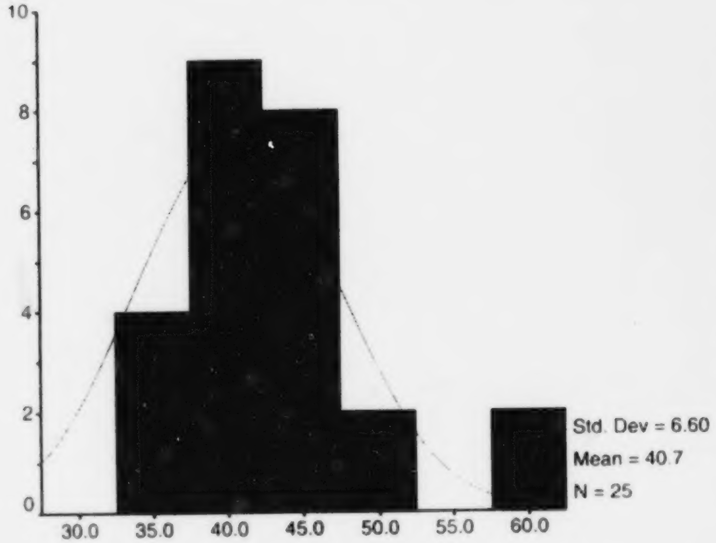

Figure 6.12: Histogram of lateral expansion, trianguloid end scrapers.

this snapping has been inferred in the past to be indicative of hafting. Some (i.e. Brink 1978:129) have had trouble duplicating this snapping in experiments. It is possible however to independently test the idea that snapping results from hafting and derivatively, to argue for the use of socket hafts.

This test is predicated on the assumption that there will be changes in bit morphology as the end scraper is resharpened. One would expect an unsharpened or little resharpened end scraper to exhibit different bit angles and bit shapes than heavily resharpened specimens. Less resharpened end scraper bits should be more acute-angled but through continued resharpening and as an inevitable consequence of a purely unifacial retouch, the bits should steepen. Similarly, one would expect continued resharpening to result in flatter bits. This flattening may be partially due to differential wear. Given the convex nature of the working end, the centre of the bits may become more worn than the margins towards the lateral tool edges. Hence, they may be more extensively altered in the centre by resharpening resulting in flatter bits. Alternatively, bits should become flatter if socket hafts were used. Since the bits are convex, resharpening of the margins of the bit will become more difficult as the bit is reduced. At a certain point, the lateral margins will encroach on the socket first and after that point, retouch must necessarily be more focussed on the centre of the bit. The result is a flatter bit as diagrammed on Figure 6.13A. I suspect this is a more important factor in producing flatter bits than differential wear.

If these expectations of the effects of continued resharpening are realistic then we would expect bits snapped in use to be less resharpened than complete discarded items. Although width might stay relatively constant over a lifespan, the bits fragments should exhibit more acute edge-angles and more convex bits as measured by bit width to depth ratios. In addition, bits should become shallower with more resharpening and perhaps even thicker as the blanks tend to be thicker as one moves towards the proximal end of the flake. Moreover, I would expect the bits to be quite distinct in these regards. Basically, snapping should occur more often when the tools are very early in their use-life when they are relatively

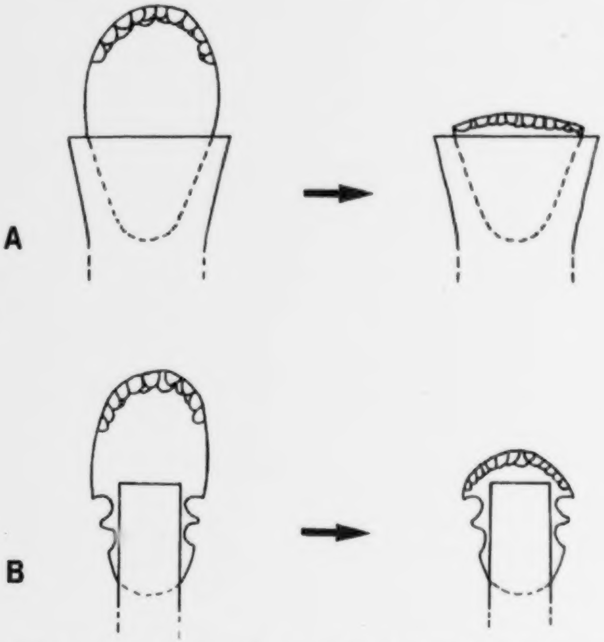

Figure 6.13: Differential effects of socket and slot hafts on resharpened end scraper bit morphology. For clarity of presentation, binding has been omitted. A: Triangular end scraper; B: Laterally notched end scraper.

long. As they become shorter, less leverage can be applied on the scraper and a much greater amount of force is necessary to snap them. In fact, the inability to snap such tools in Brink's (1978) study may be because the replicated items were too short and more closely approximated exhausted rather than newly produced tools. The expected trends seem evident in a simple comparison (Table 6.11). Statistical tests comparing bit width, depth, thickness, angles, and width to depth ratios between the complete items and those with snapped bits (including the complete item in two pieces which had its bit snapped off in use) show as expected that there are significant differences at the .05 level (Table 6.12). An exception is width. Snapped distal ends have thinner, deeper and more acute-angled bits and socket hafting and breakage in use is supported by these data.

After snapping, the abrupt break on the distal portion of proximal ends may to be too steep on average to allow resharpening and simple discard would result. Some of the snapped proximal ends from unifacial tools among the tool fragments recovered (see below) may be parts of trianguloid end scrapers even though they are too incomplete to state this with certainty. However, there is at least one trianguloid end scraper which exhibits evidence of a snap prior to continued retouch and presumably, use (Figure 6.9h).

As implied above, these items frequently exhibit modifications which are confined to areas immediately adjacent to the bit. They consist of lateral spurs and notches (Table 6.10). Some spurs could be a result simply of resharpening to a flat bit which left a very abrupt corner on the tool (e.g. Figure 6.9). However, in several cases the spur is down from such corners and must be seen as a tool accessory or perhaps in some case, recycling into other uses (e.g. Figure 6.9b, i, k). That such recycling into gravers definitely occurred is indicated by four items which have had spurs produced at the proximal ends (N=3) or centre of the bit (N=1) after serving as trianguloid hafted scrapers (Figure 6.10a-d; see piercer discussion in a later section). This raises the possibility that the spurs on side edges were also a product of recycling but that simply the spur placement does not allow us to definitively recognize them as such. The notches also may be accessories or recycling products. Their location near to bit ends suggests they are not hafting notches. Also, at sites such as Thedford II (Deller and Ellis 1992b:55-56; Ellis 1984:200) as well as on one item in the present sample with an inverse notch (Figure 6.9q), we can document examples where bit resharpening actually encroached on a pre-existing notch strongly suggesting the notch was not encased in binding. However, even if not hafting notches, this does not mean the notches were used as working edges. For example, and given their placement just beyond an encasing haft, the notches could be used to gain a grip on the item to remove them from a handle such as a socketed "jam-haft" in which they could have been tightly wedged.

Excluding the definitive items with spurs produced by recycling, ten tools have spurs or notches or both near the bit end (Table 6.10). The Parkhill assemblage does not appear to exhibit the consistent notch/spur lateral edge placement found at Thedford II (Ellis 1984:199). Five have solely a single spur which is located in three cases at the left lateral edge/bit juncture and in the remaining instances, at the right juncture. Two other tools lack spurs but have a single notch on the left edge. The three other tools have a notch on one edge and a spur on the other. In two cases the notch is on the left and the spur on the right while in the other case, it is the reverse.

Table 6.1: End Scraper Length.*

END SCRAPER	N	RANGE	MEAN	S.D.	C.V.
Trianguloid	18	25.8-49.6	34.13	7.216	21.10
Laterally Notched	2	29.8-42.1	35.95	-	-
Fluted	2	25.5-26.2	25.85	-	-
Large Parallel-Sided	1	-	78.20	-	-
Narrow	9	28.2-54.1	37.87	9.249	24.42
Offset	1	-	36.70	-	-
Bi-Bitted	3	25.4-33.3	28.43	4.257	-

*: N=number of specimens; S.D.=standard deviation; C.V.=coefficent of variation; measurements in mm.

Table 6.2: End Scraper Width.

END SCRAPER	N	RANGE	MEAN	S.D.	C.V.
Trianguloid	30	20.7-40.9	26.51	4.019	15.16
Laterally Notched	3	23.6-24.4	24.00	0.404	-
Fluted	2	24.6-26.8	25.70	-	-
Large Parallel-Sided	9	27.0-38.2	34.19	3.602	10.53
Narrow	9	18.8-45.1	30.60	9.606	31.39
Offset	3	21.8-28.5	25.47	3.395	-
Bi-Bitted	3	21.0-23.1	22.13	1.060	-

Of final note are nine items recycled into other uses. This recycling occurs on five of the complete intact items, the one complete but snapped item and five of the bits. Four were reworked into spurs or piercers, three were reworked into narrow end scrapers, and two were reworked at the proximal end to form bi-bitted end scrapers (Figure 6.10). The specific nature of such reworking will be described with other examples of these three tool forms in later sections.

Laterally Notched End Scrapers

Three end scrapers in the assemblage (Figure 6.11e, 6.14a-c) are similar to the trianguloid forms but are singled out as a separate type because they appear to have been hafted differently. Two items are complete while the other is missing a small part of the proximal end.

Table 6.3: End Scraper Thickness.

END SCRAPER	N	Range	Mean	S.D.	C.V.
Trianguloid	31	4.3-14.8	8.04	2.456	30.55
Laterally Notched	3	5.3-7.0	6.27	0.874	-
Fluted	2	7.1-7.2	7.15	-	-
Large Parallel-Sided	9	8.0-14.4	10.29	2.097	20.34
Narrow	9	5.0-13.2	8.38	3.211	38.32
Offset	3	5.0-10.8	8.70	3.214	-
Bi-Bitted	3	6.1-11.9	8.27	3.166	-

Table 6.4: End Scraper Bit Angles.*

END SCRAPER	N	Range	Mean	S.D.	C.V.
Trianguloid	30	45-85	67.17	8.899	13.26
Laterally Notched	3	57.5-67.5	63.33	5.204	-
Fluted	2	70-75	72.50	-	-
Large Parallel-Sided	10	52.5-77.5	65.50	8.644	13.20
Narrow	10	70-87.5	76.75	5.407	7.05
Offset	3	42.5-60.0	50.83	8.780	-
Bi-Bitted	6	65-85	74.58	6.785	9.10

*: measurements in degrees.

These three items are the only end scrapers to exhibit lateral notches which are not immediately at or near the bit end. Indeed they are very close to the haft end. Moreover, and also unlike the notches on trianguloid forms, multiple closely spaced notches are present from around mid-point to near the proximal end on each lateral edge. On one item there are two notches on each side edge (Figure 6.14b) and on another example, three notches occur (Figure 6.14c) The remaining item has two notches on one edge and three on the other (Figure 6.11e, 6.14a). The notches on each edge isolate or isolated (one is recently broken) between them one or more slight spurs which do not appear to be tool, accessories because of their recessed nature. Although the sample is too small to derive firm conclusions, these items do not expand as markedly from the platform as the majority of the simple trianguloid forms, having only 25-30^0 divergence (Figure 6.7).

The notch placement and suggestion of a less tapered lateral edge implies a different unsocketed hafting in which the lateral edges of the tool were exposed. A split-end handle is suggested. This kind of hafting is also suspected because of the degree of bit convexity as measured by bit width/depth ratios (Tables 6.8, 6.13; Figure 6.4). As noted above, if the trianguloid forms were in a socket, difficulties in resharpening the bit margins may have led to a flatter bit through extended resharpening. If, however, a non-socketed haft was used in which the corners of the bit were exposed and the binding was restricted to the notch areas much removed from the end of the haft, no such difficulty would be encountered (Figure 6.13B). Even if heavily resharpened, the bit could still be quite convex upon discard. The fact the bits on these items have relatively low width/depth ratios is consistent with this inference although in the one case (Figure 6.14b), this low ratio could also be due to snapping early in use before a flatter bit was produced by continued resharpening.

Table 6.5: End Scraper Bit Width.

END SCRAPER	N	Range	Mean	S.D.	C.V.
Trianguloid	30	20.7-31.3	25.69	3.157	12.29
Laterally Notched	3	23.7-24.4	24.00	0.361	-
Fluted	2	24.4-26.8	25.60	-	-
Large Parallel-Sided	9	25.2-38.4	33.01	4.395	13.32
Narrow	9	7.2-14.4	10.97	2.207	20.12
Offset	3	19.2-28.5	23.23	4.771	-
Bi-Bitted	6	16.8-22.3	19.88	2.093	10.53

Table 6.6: End Scraper Bit Depth.

END SCRAPER	N	Range	Mean	S.D.	C.V.
Trianguloid	30	3.0-14.8	7.49	2.845	37.98
Laterally Notched	3	5.8-11.5	8.77	2.857	-
Fluted	2	5.1-9.7	7.40	-	-
Large Parallel-Sided	9	9.0-23.3	13.71	4.440	32.38
Narrow	10	3.3-6.0	4.49	0.916	20.40
Offset	3	5.7-14.1	10.87	4.521	-
Bi-Bitted	6	3.4-7.9	5.33	1.675	31.42

The above strongly suggests that different hafting methods were employed on end scrapers of the same general form as argued elsewhere for Paleo-Indian assemblages by Rule and Evans (1985). This variability may indicate use differences within a general trianguloid form, situational criteria such as a shortage of socket hafts or of stone blanks of a suitable morphology for socket hafting, or simply personal preference in hafting methods. In any event, the low incidence of evidence for unsocketed hafting as represented by laterally notched tools, as well as items I have referred to elsewhere as fluted forms (see below and Ellis 1984:202), suggests socketing was preferred in the Parkhill Phase industry. This evidence may provide a contrast with presumably earlier fluted point industries such as that represented at Shawnee-Minisink where ca. 58% of the tools were laterally notched (Rule and Evans 1985:216; see also Jackson 1998:122-127).

Fluted End Scrapers

Two items are classified here as fluted end scrapers (Figure 6.14d-e). Both have a concave dorsal surface which gives it the fluted appearance. The dorsal "flute" on all of these items is not a product of secondary modification. Rather the concave surface is a feature of the original blank selected. Like the laterally notched items they have slightly expanding (20-25° divergence; Figure 6.7) lateral edges. Both tools exhibit spurs, on one at the right distal corner and on the other at the left distal corner. In both instances these spurs were perhaps fortuitously produced by chipping a notch (for binding?) which, due to resharpening, ended up close to the right lateral distal edge juncture. One of these tools (Figure 6.14d) is notable in that it has some ventral thinning of the proximal end by two lateral, almost burin-like, removals (as well as dorsal retouch) which was undoubtedly designed to thin the end for mounting in a handle.

Table 6.7: End Scraper Bit Thickness.

END SCRAPER	N	Range	Mean	S.D.	C.V.
Trianguloid	31	3.5-13.2	7.03	2.537	36.09
Laterally Notched	3	5.1-7.1	5.87	1.079	-
Fluted	2	6.0-6.8	6.40	-	-
Large Parallel-Sided	9	6.0-11.9	8.31	2.196	26.43
Narrow	10	3.1-5.7	4.18	0.710	16.99
Offset	3	3.0-10.2	6.83	3.623	-
Bi-Bitted	6	5.6-7.6	6.18	0.828	13.40

Table 6.8: End Scraper Bit Width/Depth.

END SCRAPER	N	Range	Mean	S.D.	C.V.
Trianguloid	29	2.0-7.0	3.818	1.295	33.92
Laterally Notched	3	2.1-4.2	2.972	1.104	-
Fluted	2	2.8-4.8	3.770	-	-
Large Parallel-Sided	8	1.6-3.4	2.510	0.604	24.06
Narrow	9	1.7-4.1	2.500	0.814	32.56
Offset	3	1.7-3.4	2.369	0.878	-
Bi-Bitted	6	2.8-5.9	3.990	1.148	28.77

Two very similar tools were recovered from the nearby Thedford II site (Deller and Ellis 1992b:59-60; Ellis 1984:210). Because they are roughly parallel-sided with a concave dorsal (and in one case from Thedford II, the ventral as well) surface, and are thickest towards the side edges it has been suggested that they were hafted differently than the normal trianguloid forms; that is, in a split end handle rather than a socketed handle. In other words,

Table 6.9: End Scraper Curation/Reduction Indexes.

END SCRAPER	N	RANGE	MEAN	S.D.	C.V.
Trianguloid	31	0.3-1.0	0.88	0.158	17.96
Laterally Notched	3	0.8-1.0	0.94	?	-
Fluted	2	0.8-0.9	0.85	-	-
Large Parallel-Sided	9	0.6-1.0	0.81	0.161	19.88
Narrow	10	0.3-0.7	0.52	0.136	26.15
Offset	3	0.6-0.9	0.75	0.176	-
Bi-Bitted	6	0.5-1.0	0.80	0.203	25.38

they were hafted in a manner similar to that of the laterally notched end scrapers just described. It was noted that the laterally notched end scrapers had relatively convex bits. It was suggested his was due to the fact they could continue to be resharpened at the corner of the bit due to the lack of an enclosing socketed haft or binding in that area. If this is the case, we might also expect the fluted forms to be discarded with relatively convex bits and one of the fluted end scrapers (Figure 6.14e) meets this criterion (bit width to depth ratio of 2.8). Yet, at least one fluted form (Figure 6.14d) has a quite flat bit (bit width to depth ratio of 4.8). It may be the corners of this item could not be resharpened due to other factors. For example, and as suggested by the notch placement, the binding may have extended right to the corner prohibiting resharpening in that area. Alternatively, the notch may have been a tool accessory and in order to maintain that accessory the corner could not be resharpened.

Large Parallel-Sided End Scrapers

Ten tools are placed into this type (Figure 6.15). Only one is complete (Figure 6.11a, 6.15a). The rest are represented by snapped bit ends which suggests, especially given their thick massive nature, that these tools were hafted. Also, the only complete example has been thinned at the proximal end by ventral and dorsal removals, again suggesting these tools were hafted. Three of the bit ends have been recycled. Two (Figure 6.21d-e) are recycled into simple beaks and are discussed more fully along with other examples of that type to be described later. However, data on bit shape and some measures of blank size for these items are included here. The final recycled item (Figure 6.15c) has been retouched along a left lateral edge to form a convex working margin. This retouch partially obscured a transverse snap near that margin. Since that recycling is unique, the tool is only included in the totals for large parallel-sided end scrapers in this report. For some unknown reason, these tools are often on the less common materials in the assemblages in which they occur (Deller and Ellis 1992a:46). Indeed, including the recycled forms six of the Parkhill items or 60% are not on Collingwood variant cherts (see Table 4.1). The preference for other cherts in specific types such as this one has led to the suggestion they might represent evidence of inter-band exchange (Deller 1989:211).

These end scrapers are distinctive in several respects. First, they are clearly parallel-sided or only very slightly convex in lateral edge outline. Second, although two have

Figure 6.10: Trianguloid End Scraper Data.

FC#	Raw Material	Recycling	Condition	Thick.	Proximal Dorsal Trimming	Bit Width
1101	Collingwood	no	bit end	4.3	No	29.2
1102	Collingwood	no	complete	10.5	Yes	25.0
1104	Collingwood	bibitted end	other	6.8	No	20.7
1105	Collingwood	no	bit end	5.5	No	25.5
1106	Collingwood	no	complete	8.7	Yes	24.1
1122	Collingwood	piercer	bit end	8.5	Yes	31.1
1218	Collingwood	no	complete	8.1	No	29.1
1249	Collingwood	no	complete	6.1	No	22.3
16	Collingwood	no	complete	14.8	Yes	23.6
185	Collingwood	no	complete	5.8	No	29.1
188	Collingwood	no	complete	6.5	No	22.5
211	Collingwood	no	complete	8.5	No	29.1
213	Colllingwood	piercer	complete	9.4	No	23.6
215	Collingwood	bibitted end	other	6.1	No	22.3
216	Collingwood	no	complete	5.8	No	29.8
22	Collingwood	narrow end	complete	7.2	No	23.5
241	Collingwood	no	complete	10.4	No	22.7
769	Bayport	piercer	other	8.3	No	25.9
276	Collingwood	no	complete	8.1	No	26.1
281	Collingwood	no	bit end	4.8	No	30.1
345	Collingwood	no	complete	5.9	No	20.9
393	Collingwood	no	complete	13.2	Yes	24.4
395	Collingwood	narrow end	other	7.3	No	23.2
4	Collingwood	no	bit end	4.9	No	25.2
404	Collingwood	no	complete	7.8	No	28.1
405	Collingwood	no	complete	10.7	No	25.4
453	Collingwood	no	lateral	9.1	No	-
482	Onondaga	piercer	other	6.2	No	22.0
656	Onondaga	no	complete	11.2	No	26.0
788+	Onondaga	narrow end	bit end	10.1	No	31.3
862	Bayport	no	complete	8.5	No	28.9

Table 6.10: Continued.

FC#	Bit Depth	Bit Thickness	Bit Width/Depth	Bit Angle	Spurs?	Notch?
1101	7.2	4.0	4.1	57.5	no	no
1102	6.8	10.5	3.7	67.5	left	right
1104	6.7	6.8	3.1	77.5	no	no
1105	8.7	3.5	2.9	52.5	no	left
1106	5.3	8.7	4.5	65.0	left	no
1122	13.8	7.7	2.3	55.0	no	no
1218	6.8	8.0	4.3	65.0	right	left
1249	4.6	5.0	4.8	70.0	no	no
16	6.8	11.2	3.5	70.0	right	no
185	5.6	4.6	5.2	67.5	right	no
188	3.7	6.5	6.1	75.0	no	no
211	14.8	8.5	2.0	80.0	no	no
213	-	9.1	-	-	no	no
215	7.9	5.7	2.8	85.0	no	no
216	7.5	4.5	4.0	70.0	no	no
22	10.9	7.1	2.2	60.0	no	no
241	7.1	10.3	3.2	80.0	right	left
769	10.0	8.3	2.6	67.5	no	no
276	5.4	8.0	4.8	67.5	no	no
281	11.1	4.1	2.7	52.5	no	no
345	3.0	4.7	7.0	62.5	no	no
393	7.0	13.2	3.5	70.0	no	no
395	6.8	6.1	3.4	70.0	no	no
4	7.3	4.8	3.5	62.5	no	left
404	5.0	4.7	3.6	67.5	no	no
405	4.7	10.7	5.4	72.5	left	no
453	5.2	9.1	-	72.5	?	?
482	10.4	4.6	2.1	65.0	no	no
656	4.8	7.1	5.4	77.5	no	no
788+	11.3	3.5	2.8	45.0	no	no
862	8.4	7.3	3.4	65.0	left	no

a slight distal curvature, the remainder are almost totally flat in longitudinal section and contrast therefore with all the other end scraper types (Figure 6.6). Third, they lack notches as tool accessories or hafting modifications. Fourth, although they can exhibit spurs (5 examples), two have purposeful spurs at the juncture of the bit and lateral edges on both sides (Figure 6.15d, g). These are the only examples of bi-spurred end scrapers known from Parkhill Phase contexts. Finally, the bits are relatively wide and deep (Figures 6.1, 6.2; Table 6.13) with relatively low bit width/depth ratios versus types such as the trianguloid and fluted forms (Table 6.8; Figure 6.4).

Table 6.11: Complete and Snapped Bits Data Summaries, Trianguloid End Scrapers.

TRAIT	COMPLETE ITEMS MEAN (standard deviation; N)	SNAPPED BIT MEAN (standard deviation; N)
Bit angle	70.2778 (5.1370; 18)	55.0000 (6.3246; 6)
Bit depth	6.250 (2.549; 18)	9.417 (1.923; 6)
Bit thickness	7.984 (2.554; 19)	4.500 (1.361; 6)
Bit width	25.594 (2.818; 18)	27.467 (3.142; 6)
Bit width/ depth ratio	4.492 (1.241; 17)	3.013 (0.659; 6)

Table 6.12: Mann-Whitney U Tests Comparing Complete and Snapped Bits, Trianguloid End Scrapers.

TRAIT	N1* (Sum of Ranks)	N2* (Sum of Ranks)	U	SIGNIFICANCE (2-tailed)
Bit angle	18 (278.50)	6 (21.50)	0.50	.000
Bit depth	18 (181.00)	6 (119.00)	10.00	.003
Bit thickness	19 (293.50)	6 (31.50)	10.50	.003
Bit width	18 (203.00)	6 (97.00)	32.00	.142
Bit width/ depth	17 (241.00)	6 (35.00)	14.00	.010

N1: complete; N2: snapped bits.

This last contrast, particularly versus trianguloid forms, could be due to degree of resharpening -- if we consider that most examples from Parkhill of these large end scrapers are snapped bits. As noted in the discussion of the trianguloid forms, bits snapped in use tend to have larger bits with low bit width/depth ratios and indeed, the snapped trianguloid bits are not much different in this regard from the items considered here in terms of that ratio (compare Tables 6.8 and 6.11). This similarity raises the possibility that the type isolated here simply represents snapped trianguloid bits. However, this possibility seems remote. For one thing, the large parallel-sided end scrapers do tend to have wider and deeper

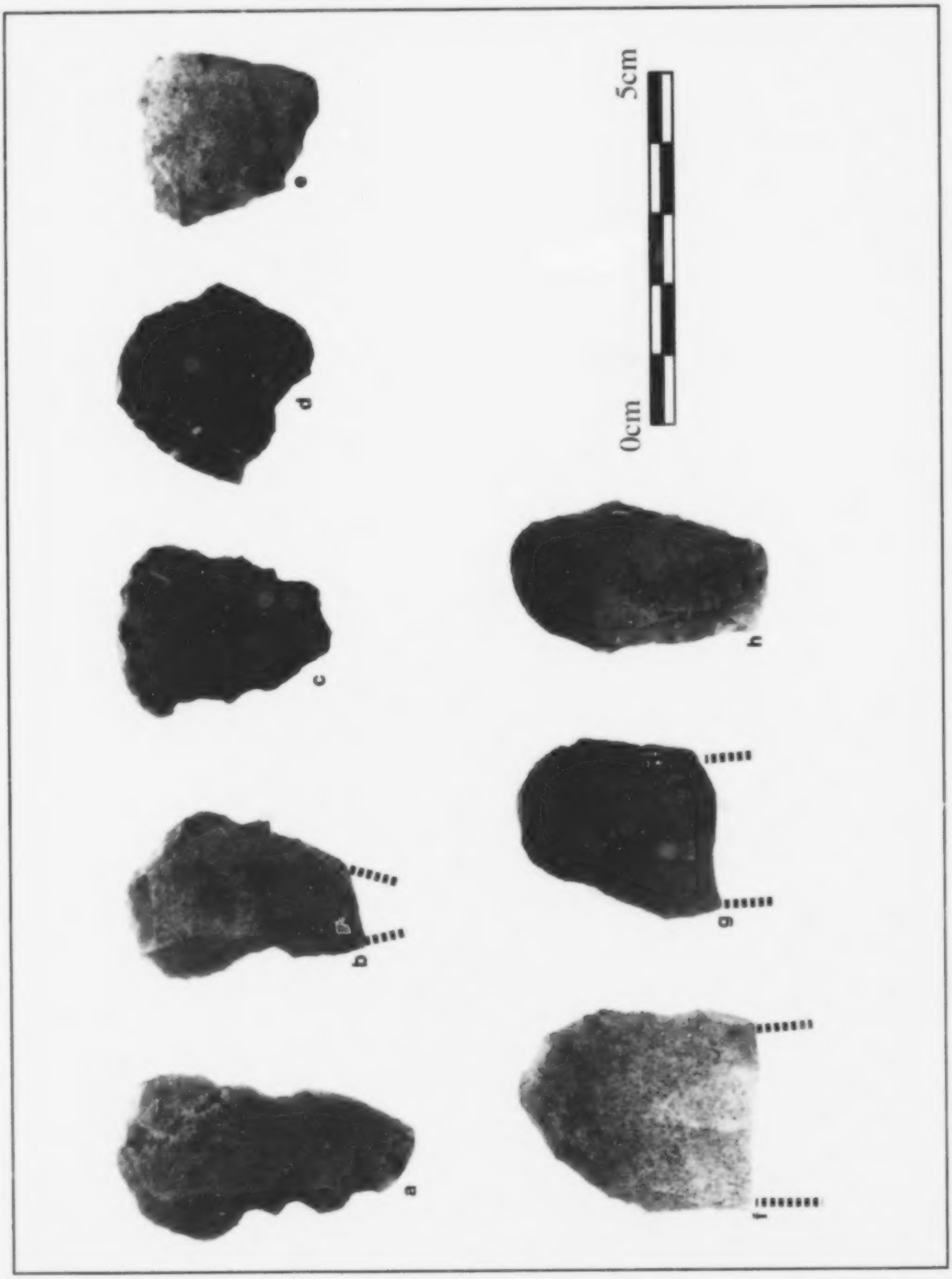
a
b
c
d
e
f
g
h
0cm
5cm

Figure 6.14: Laterally notched (a-c), fluted (d-e) and offset (f-h) end scrapers.

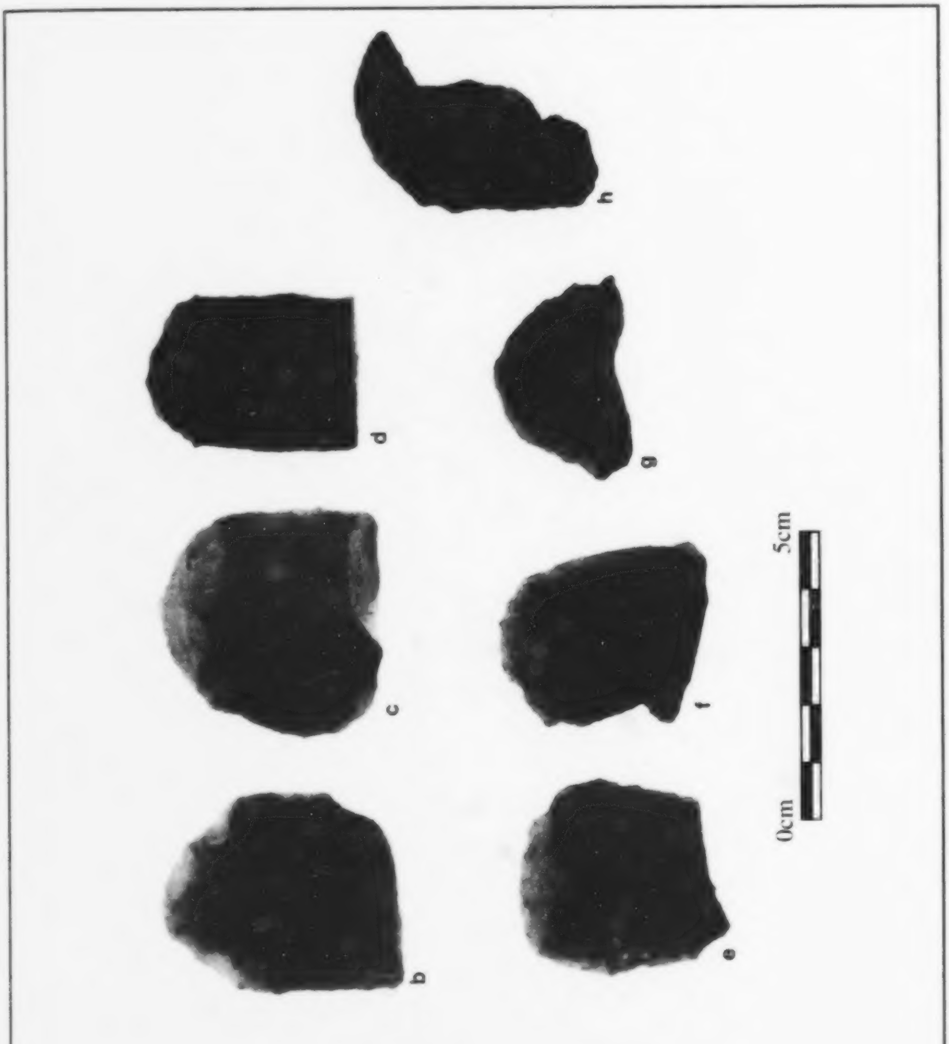
a
b
c
d
e
f
g
h
0cm
5cm

Figure 6.15: Large parallel-sided end scrapers. d and g have bilateral corner spurs.

Table 6.13: Other End Scrapers, Bit Data.

FC#	Type	Bit Width	Bit Depth	Bit Thickness	Bit Angle*	Reduction Index
22	Narrow	7.2	3.3	4.5	70.0	0.63
1142	Narrow	10.4	6/0	5.7	75.0	0.43
31	Narrow	11.4	5.1	3.4	70.0	0.67
876	Narrow	10.3, --	4.7, 3.7	4.5, 4.4	77.5, 87.5	0.34, 0.34
1123	Narrow	10.5	4.4	3.1	75.0	0.62
807	Narrow	10.3	5.7	4.0	75.0	0.44
788+	Narrow	10.0	4.6	4.3	82.5	0.43
395	Narrow	14.4	3.9	4.1	80.0	0.56
649	Narrow	14.2	3.5	3.8	75.0	0.70
9	Large Parallel	25.2	9.0	6.0	72.5	0.73
347	Large Parallel	28.0	11.1	8.9	67.5	0.80
187	Large Parallel	31.1	16.2	7.6	70.0	0.82
775+	Large Parallel	--	11.5	--	77.5	--
1143	Large Parallel	36.3	13.0	6.1	62.5	0.55
5	Large Parallel	34.4	17.1	11.7	52.5	1.00
53	Large Parallel	33.0	11.2	8.0	52.5	0.98
343	Large Parallel	38.4	23.3	11.0	62.5	0.83
520	Large Parallel	32.9	–	8.0	62.5	1.00
499	Large Parallel	37.8	11.0	6.6	75.0	0.62
20	Laterally Notched	23.9	9.0	7.1	57.5	1.01
462	Laterally Notched	24.4	5.8	5.1	67.5	0.96
10	Laterally Notched	23.7	11.5	5.4	65.0	0.83
11	Offset	28.5	14.1	10.2	60.0	0.94
1124	Offset	10.2	5.7	3.0	50.0	0.60
214	Offset	22.0	12.8	7.3	42.5	0.71
186	Fluted	24.4	5.1	6.0	70.0	0.85
864	Fluted	26.8	9.7	6.8	75.0	0.94

*mid-point of range.

bits than even those from trianguloid forms. As well, they do not exhibit the acute-angled bits characteristic of the less resharpened snapped trianguloid forms (Tables 6.4, 6.11, 6.13). Third, in many cases they have extensive lateral retouch extending all the way to the lateral end/bit juncture on one or both edges designed to produce relatively parallel-sides (e.g. Figure 6.15a, c, d,e,f,h) which is not evident even on the longer or snapped bits of the trianguloid forms broken early in their use-life. Finally, characteristics noted above such as a lack of curvature and double spurs are not found on any definite trianguloid forms.

Two items from the Thedford II site referred to as end and convex side scrapers (Deller and Ellis 1992b:66; Ellis 1984:210) may be of the same type as the large items reported here. Both were relatively complete but one had a snap at the proximal end. As with the Parkhill forms, they only exhibit slightly convex lateral edges, have very large, deep, convex bits and lack curvature and notches. The Thedford II examples did not exhibit any definitive evidence of secondary hafting modification. However, one of the Thedford II examples was also a snapped bit which may suggest they also were hafted tools like the Parkhill examples.

Offset End Scrapers

This tool form has been reported from other sites, notably Thedford II (Deller and Ellis 1992b:57-59) where they were referred to as "assymetrical or offset" end scrapers. Three such items occur in the Parkhill collections two of which are snapped bit ends (Figure 6.14f-h). The snapped bits might be used to argue these tools were hafted but in only one case is this an old break and at sites like Thedford II where a somewhat larger sample is available, all are complete suggesting they were not hafted.

The most distinctive aspect of these tools is the placement of the bit canted or offset to one distal corner and on all the examples here, as was also the case in the Thedford II sample, this canting is towards the right corner with the tool viewed in dorsal plan with the bit end placed at the top. However, these tools also consistently exhibit several other characteristics. For one, they always have pronounced distal curvature at the bit end and appear almost "hook-shaped" in profile (Figure 6.6). Therefore, it is not surprising that they are often made on flakes removed from the corners of quarry blocks which have distal curvature where the flake curved through the opposite end of the core. Two of the Parkhill example are on such flakes, one being on a secondary side-corner blank and another on a secondary top-corner blank. These items are also notable for having relatively deep, acute-angled bits (see Tables 6.4, 6.6, 6.8, and 6.13; Figures 6.2, 6.4 and 6.5) with generally poorly executed retouch. They also appear to be little resharpened and it has been argued this results from the fact continued resharpening would remove the distal curvature which seems to be essential to the tool type's function (Ellis 1984:196). One suggestion of less resharpening is the poorly executed retouch and relatively convex bits as measured by bit width/depth ratios. Moreover, these items have a low reduction or curation index. This index is a ratio of bit thickness divided by maximum tool thickness (Kuhn 1990). Since blanks tend to get thicker away from the tool edges, a ratio approaching or equal to 1.0 indicates a much more retouched tool. End scrapers by definition are heavily retouched versus tools such as retouched flakes and therefore, tend to exhibit these higher ratios. Hence, it is not surprising that all such items at Parkhill have a high ratio

(Tables 6.9 and 6.13). However, relative to most of the other end scraper types, the offset end scrapers have a lower reduction index (Figure 6.8).

One of the examples from Parkhill (Figure 6.14f) has been recycled and in a unique manner. A steep (75-80°), flat in profile, working edge has been created at the proximal end.

Narrow End Scrapers

Nine tools of this type occur in the Parkhill assemblage (Figures 6.10g-i, 6.16). They are distinguished by the presence of a very narrow (Figure 6.1), steeply retouched (Figure 6.5), convex bit. One tool (Figure 6.16a) has two bits so ten of these working ends are present in the assemblage. In addition to the narrow bit, another tool (Figure 6.16c) also has a denticulated working edges along its left lateral margin and a small substantial notch adjacent to the bit on one side formed by inverse retouch.

Five of these tools were apparently recycled from other tool types or classes. In one case (Figure 6.19b), the tool is made on a single concave side scraper with spur. Two other tools (Figure 6.16d-e) were perhaps also made on small side scraper fragments derived from tools of an unknown form. The remaining three items (Figure 6.10g-i) are made on trianguloid end scrapers. In one case, (Figure 6.10g), the bit was placed at the juncture of a transverse snap and the right lateral edge. In another case (Figure 6.10i), the bit was chipped on a right lateral margin around a pronounced dorsal ridge after part of the original end scraper's bit end was snapped off in use. In the final instance (Figure 6.10h), the bit was chipped at the proximal end of the original trianguloid end scraper. The bit was placed at the end of an elongated projection by narrowing the proximal half of the original tool by extensive inverse retouch along one side. This bit was also flaked around a prominent dorsal ridge. Production of a bit around a pronounced dorsal ridge is common on these tools as represented at other sites (e.g. Deller and Ellis 1992b:61-63), presumably to provide added strength during the bit's use. Overall it occurs on seven of the ten bits in the Parkhill sample including every item not made by recycling.

None of the narrow end scrapers appear to have been hafted. They vary considerably in morphology opposite the bit (e.g. they lack the standardized morphology characteristic of hafted ends). Also, they often lack shaping which might be construed as hafting modification and can be very thick at their butts which would impede mounting in handles.

Bi-Bitted End Scrapers

Three complete items have steeply retouched, convex bits at both ends of the blank (Figure 6.10e-f). In two instances, overall size, curvature and an expanding morphology from one end, indicates these are simply recycled trianguloid end scrapers which, having outlived their usefulness as that tool form were recyled by placing a second bit at the proximal end. Presumably this recycling did not involve rehafting (such as simply reversing the tool in the haft), given the expanding lateral edges away from the newly chipped bit and a lack of any thinning or other modification of the thick original bit end. The final bi-bitted form is more oval in outline (Figure 6.17c). It may also have been made by recycling a trianguloid form but it has been too reduced in length to conclude this with any certainty. Because these seem to

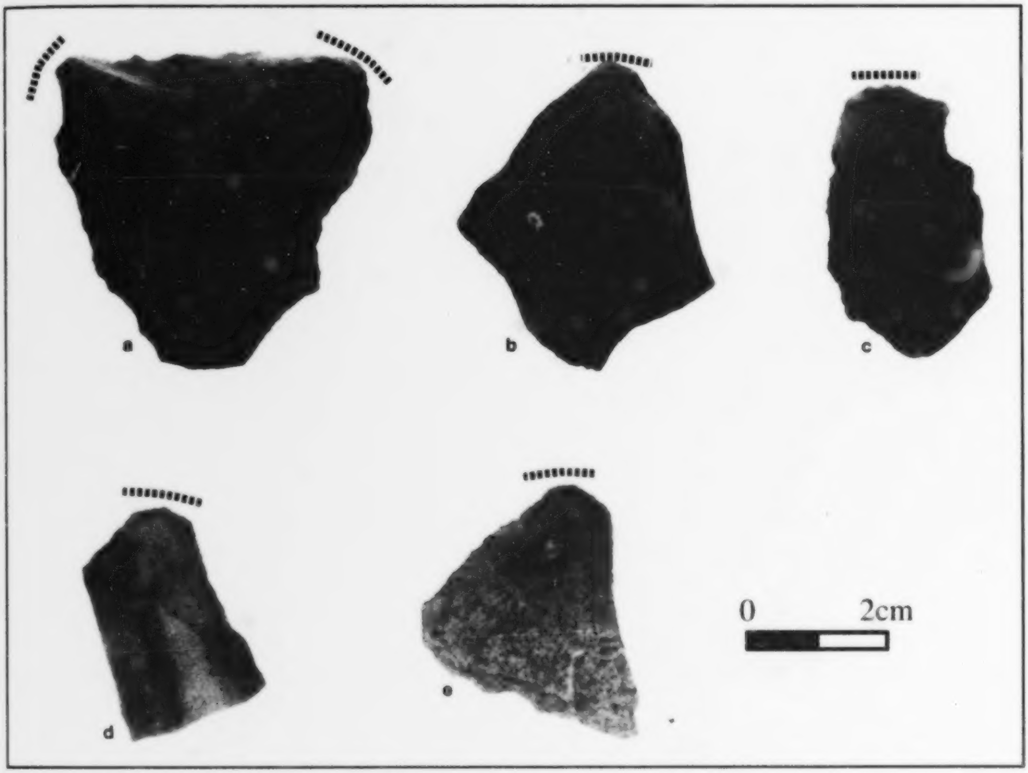

Figure 6.16: Narrow end scrapers. Dashed lines show locations of bits. d-e are probably made on side scraper fragments.

represent more expedient use of another type, they are excluded from the box-plot comparisons on Figures 6.1 to 6.8.

Other End Scrapers

Five other end scrapers are represented in the collections. Two are simply snapped bit ends which may be from trianguloid end scrapers but are too incomplete for a positive identification. The other three items are unique forms (Table 6.14).

One tool is a small, thin, "thumbnail" form with a spur in the middle of the left lateral edge (Figure 6.17b). This tool exhibits two burin-like removals along the juncture of a snap at the proximal end with the ventral surface using the steeply retouched lateral edge as a platform for the detaching blows. Whether this items represents a purposeful burin (i.e. was created to form a working surface) or fortuitous is unknown. Since the proximal end of the tool was snapped off, it is possible that these burin spalls were removed to thin the tool for re-hafting rather than to create a working edge. In any case, it is the best and only candidate for

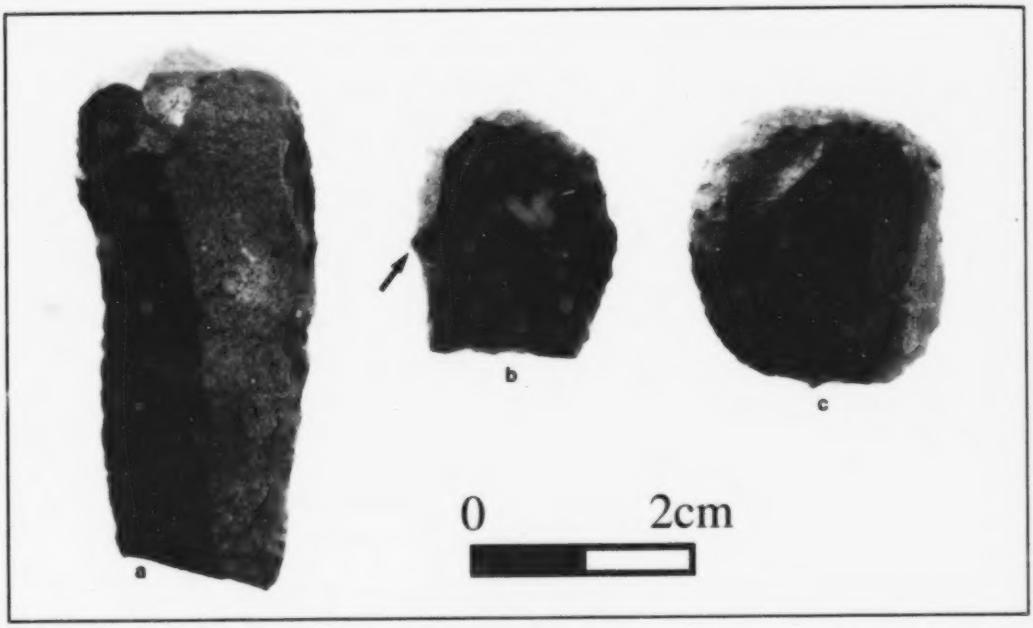

Figure 6.17: Miscellaneous end scrapers. a: end of blade scraper; b: thumbnail end scraper with spur shown at arrow; c: bi-bitted end scraper -- possible spur at bottom.

a burin so far reported from Parkhill Phase contexts and is very similar to a burin made on an end scraper reported from the Noble's Pond site in northeast Ohio (Gramly and Summers 1986: Figure 4h).

A distinctive end scraper in the sample is a long, thick, form with a steeply retouched bit made on a secondary top-corner struck flake (Figure 6.17a). It resembles the "end of blade scrapers" reported from Debert (MacDonald 1968:94). A complete specimen and a bit fragment of virtually identical tools were recovered from the Parkhill Phase sites of McLeod and Thedford II (Ellis 1984:206).

A final very distinctive end scraper is made on a tiny (0.25 gm) uniface retouch flake (see next chapter) with slightly expanding lateral edges (Ellis 1994a: Figure 5b). The distal end has been intentionally and steeply bevelled by the removal of 11+ very fine (<1 mm wide) retouch flakes and one lateral edge has some retouch resembling the tapering retouch for hafting on the trianguloid end scrapers. The lateral retouch suggests this artifact was actually placed in a tiny haft. As with the channel flake points, it is possible this tool is a toy but distributional data discussed below and elsewhere (Ellis 1994a) suggests it is more likely an amulet of some kind.

Side Scrapers

Eighteen relatively complete items represent or represented (prior to recycling) this

Table 6.14: Other End Scraper Variables.*

VARIABLE	END OF BLADE SCRAPER	THUMBNAIL SCRAPER	MINIATURE SCRAPER
Length	-	-	8.7
Width	21.8	18.7	9.0
Thickness	12.7	3.3	2.2
Bit width	19.7	12.1	9.0
Bit depth	6.6	10.3	1.2
Bit thickness	10.7	3.3	2.0
Bit width/ depth ratio	3.0	1.2	7.5
Bit angle	75°	65°	72.5°
Curvature; placement	10; distal	15; N/A	N/A

*N/A: not applicable.

class of tool (Figures 6.11b; 6.18; Tables 6.15-6.17). All are defined by the presence of extensive (i.e. greater than 2.5 mm long), continuous, unifacially retouched edges along one or both lateral margins. Usually the retouch applied is normal but in five cases of tools made on primary or secondary flakes (see Chapter 4) with relatively flat dorsal and more convex ventral surfaces (i.e. the reverse of the normal flake cross-section; Figures 6.18c, d, f, g), the retouch is inverse or occurs on the ventral face -- probably because it is much easier to remove retouch flakes from the convex as opposed to flat surface.

Several varieties of side scrapers are represented based on the presence of one or two lateral working edges and the outline shape in plan of those edges (Table 6.15). As a whole, and although the odd item can be on a relatively curved flake, the blanks chosen for side scrapers tend to be flatter than those chosen for say trianguloid end scrapers and a Mann-Whitney U Test comparing the two categories confirm that the side scrapers are on blanks with less curvature ($U=109.5$; $p \leq .01$). In fact, in at least two cases, side scrapers made on flake types which tend to have more pronounced distal curvature have had their distal ends trimmed ventrally by gross flake removals to remove this curvature. This retouch indicates a flatter flake was more suited for most side scraper tasks. A notable exception is a single concave form (Field Catalogue #1144; Figure 6.19c) which has a relatively pronounced curvature (see Table 6.15). There is no evidence of trimming for hafting on the side scrapers from Parkhill and therefore, and again as compared to hafted tools like trianguloid end scrapers, there is a much higher percentage of side scrapers with moderate to pronounced bulbs (11/12 side scrapers or 91.7% in comparison to 8/16 or 50% of the trianguloid end scrapers) and consequently, thicker proximal ends.

Ten of these side scrapers are worthy of additional comment. One, consisting of a double alternate form (Figure 6.22a), is notable in that it has been recycled into a multiple piercer or graver at one end. There can be no doubt that the forming of these gravers was a result of recycling as the retouch involved in their

Table 6.15: Side Scraper Variables.

FC #	FORM	RAW MATERIAL	LENGTH	WIDTH	THICK-NESS	CURVATURE
836	Single Convex	Collingwood	-	15.0	4.1	12
1460	Single Convex	Collingwood	49.2	40.1	13.0	15
1108	Single Convex	Collingwood	-	31.1	16.0	-
420	Single Convex	Collingwood	50.1	41.4	13.3	-
321	Single Convex	Collingwood	45.1	28.4	8.2	11
174	Single Convex	Collingwood	29.6	20.9	3.7	12
14	Single Convex	Collingwood	55.6	49.8	13.9	15
17	Single Convex	Collingwood	53.8	35.3	15.0	13
867	Single Convex	Collingwood	53.7	28.3	10.1	9
193/ 1141	Single Straight	Collingwood	37.6	54.9	5.8	15
1144	Single Concave with spur	Collingwood	54.4	33.2	9.3	5
1123	Single Concave with spur[1]	Collingwood	-	18.8	5.0	10
351	Double Convergent	Collingwood	-	28.8	12.9	15
1137	Double Convex	Collingwood	100.5	47.2	7.2	14
1126	Double Convex	Bayport	-	33.2	5.6	9
1127	Double Concave-Convex with spur	Bayport	77.0	35.2	7.5	13
1136	Double Concave with spur	Collingwood	34.4	25.4	5.9	15
406	Double Alternate[2]	Collingwood	38.2	26.3	7.8	15

[1]: recycled into narrow end scraper; [2]: recycled into multiple graver at one end.

creation removed part of one of the bevelled side scraper edges. Hence, this tool is discussed again with the other piercers later. Recycling however, does not account for four other side scrapers with spurs (Figure 6.11b; 6.19). Besides the spurs, these tools all exhibit at least

Table 6.16: Side Scraper Left Edge Characteristics.

FC #	FORM	EDGE SHAPE	EDGE THICKNESS	RETOUCH LENGTH	EDGE ANGLE
836	Single Convex	-	-	-	-
1460	Single Convex	-	-	-	-
1108	Single Convex	convex	5.6	6.7	67.5
420	Single Convex	-	-	-	-
321	Single Convex	-	-	-	-
174	Single Convex	convex	3.7	5.6	62.5
14	Single Convex	-	-	-	-
17	Single Convex	convex	5.4	6.7	55.0
867	Single Convex	-	-	-	-
193/ 1141	Single Straight	-	-	-	-
1144	Single Concave with spur	-	-	-	-
1123	Single Concave with spur	-	-	-	-
351	Double Convergent	convergent	4.2	5.5	60.0
1137	Double Convex	convex	7.5	9.0	67.5
1126	Double Convex	convex	2.9	3.4	52.5
1127	Double Concave-Convex with spur	convex	3.9	6.1	57.5
1136	Double Concave with spur	concavo-convex	5.3	5.8	80.0
406	Double Alternate	convex	7.8	7.1	65.0

one large concave and steeply retouched (see Tables 6.16 and 6.17) working edge. They include two single concave forms, a double concave-convex form and a double form with one concave edge and one concavo-convex edge. While one of these tools has three spurs, the remainder are all single-spurred. With one exception (Figure 6.19b), all of the spurs are much more massive than those on simple gravers. The exception may be due to recycling

Table 6.17: Side Scraper Right Edge Characteristics.

FC #	FORM	EDGE SHAPE	EDGE THICKNESS	RETOUCH LENGTH	EDGE ANGLE
836	Single Convex	convex	3.7	6.0	45.0
1460	Single Convex	convex	8.5	10.3	70.0
1108	Single Convex	-	-	-	-
420	Single Convex	convex	7.3	8.8	62.5
321	Single Convex	convex	6.2	8.9	45.0
174	Single Convex	-	-	-	-
14	Single Convex	convex	7.6	18.6	62.5
17	Single Convex	-	-	-	-
867	Single Convex	convex	6.1	7.3	62.5
193/ 1141	Single Straight	straight	3.1	4.2	40.0
1144	Single Concave with spur	concave	3.5	4.5	57.5
1123	Single Concave with spur	concave	2.6	3.5	57.5
351	Double Convergent	convergent	8.0	9.8	67.5
1137	Double Convex	convex	5.1	6.4	72.5
1126	Double Convex	convex	3.3	3.8	52.5
1127	Double Concave-Convex with spur	concave	5.8	6.1	67.5
1136	Double Concave with spur	concave	5.6	6.1	77.5
406	Double Alternate	convex	7.6	8.8	57.5

since as noted in an earlier discussion, a narrow end scraper was chipped at one end. This action appears to have removed part of the spur. Often on these tools the spur occurs at the end of the concave edge (Figure 6.11b; 6.19c, d). However, they are not fortuitous as the retouch extends along the opposite side of the spur from the concave working edge and additional spurs are present on other margins of some tools.

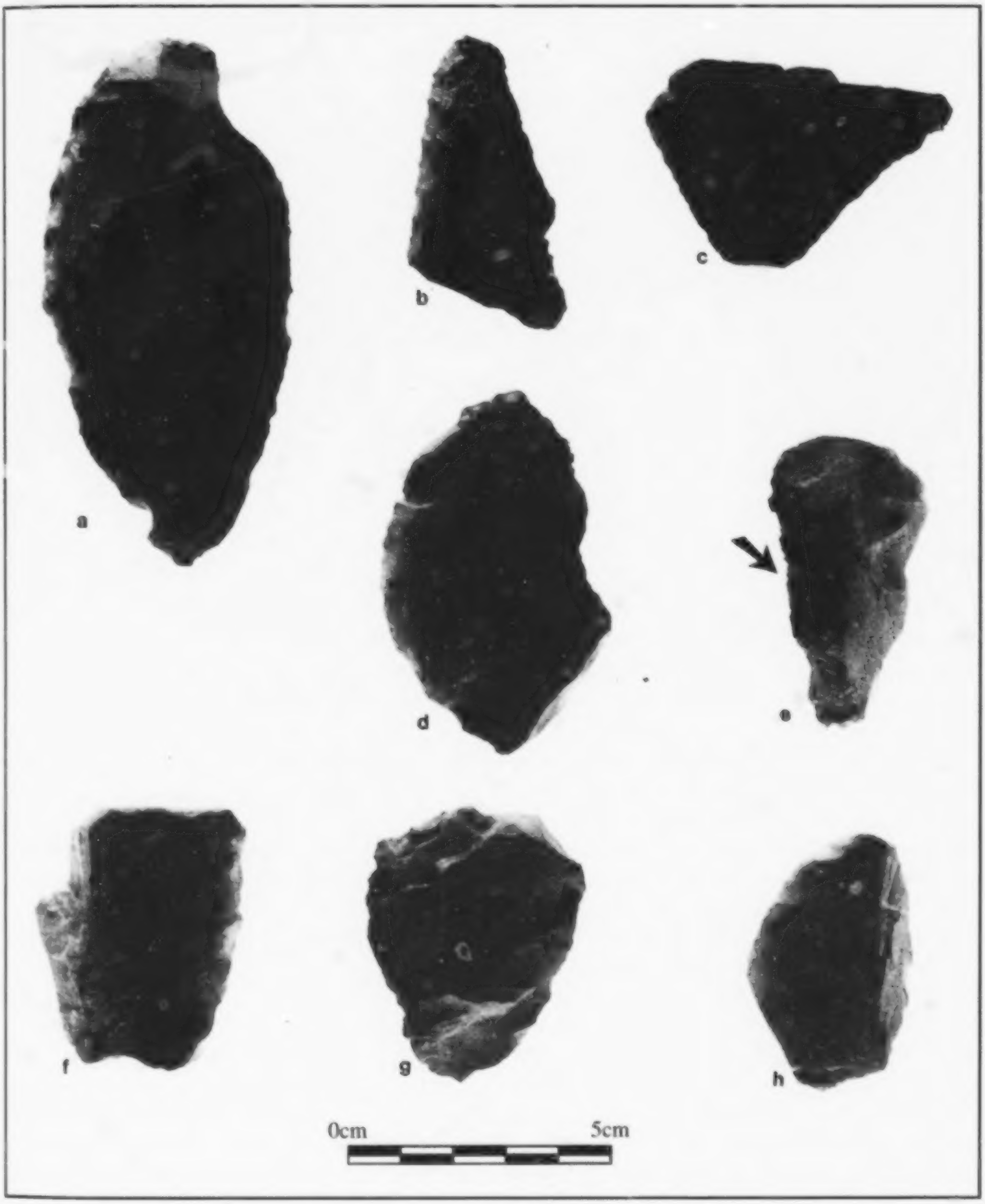

Figure 6.18: Side scrapers. Arrow shows favosite coral distinctive of Fossil Hill formation chert. c, d, and f are on primary flakes with inverse retouch.

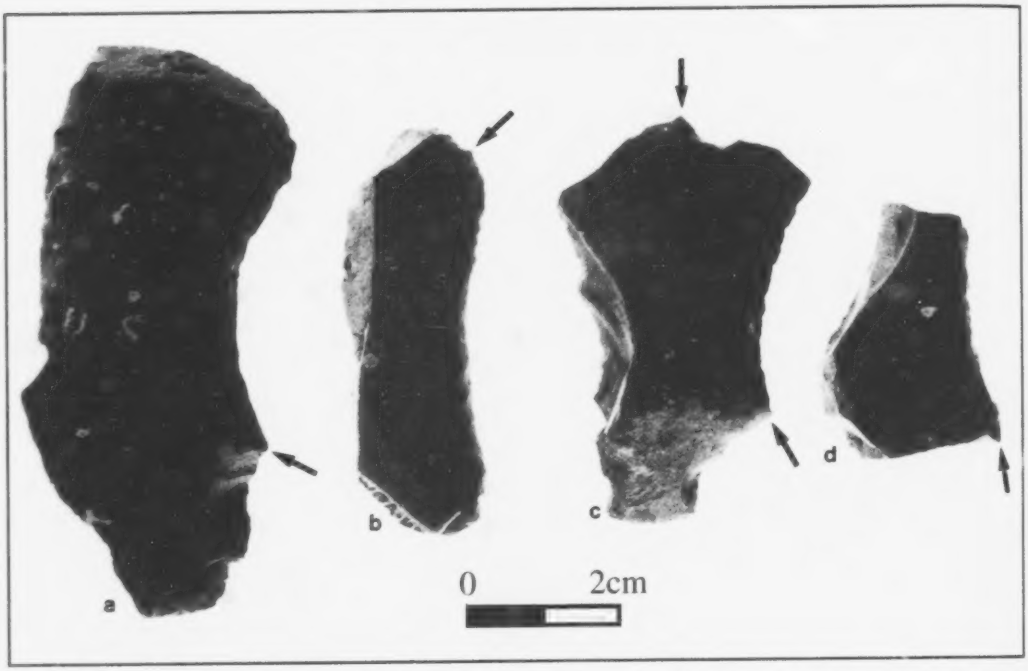

Figure 6.19: Concave side scrapers with spurs. b has been reworked into narrow end scraper at distal end (top). Arrows show spur locations.

The consistent occurrence of concave side scrapers with spurs not only at Parkhill but also, at Thedford II (Deller and Ellis 1992b:67-68), Crowfield (Deller and Ellis 1984:47) and other early sites in the Great Lakes region (Ellis and Deller 1982:14; Storck 1978: Figure 5c, bottom row, 1979: Plate 71; and perhaps, Voss 1977: Figure 4d), strongly suggests they are not a simple product of recycling. This co-occurrence indicates both use edge forms were placed together for convenience in the carrying out of a certain task requiring both a concave and spurred edge. Otherwise there is no reason that they should occur together on any consistent basis on the same, relatively simple and easy to make, tool.

Another side scraper of note is a single convex form on a large primary top-face blank (Figure 6.19f). This tool also has a retouched snap or bend break on the margin opposite the side scraper edge. The consistent co-occurrence of convex side scrapers on large top-face blanks with used bend breaks on other margins at several Parkhill industry sites such as McLeod, Dixon (see Figure 5.13), Thedford II (Deller and Ellis 1992b:67) and another unnamed site in the area, suggests again the presence of a distinctive tool type designed for use in certain task contexts requiring this combination of working edges (Ellis 1984:219-221). Three other tools have a relatively steep and continuously retouched single convex edge but the opposite edge has a fine discontinuous retouch as well.

Table 6.18: Denticulates.

FC #	LENGTH	WIDTH	THICKNESS
1119	-	16.6	4.3
555	25.0	14.5	4.6
1135	-	32.6	7.0
322	41.2	27.3	4.6

Table 6.19: Notch/Borers/Denticulates.

FC#	LENGTH	WIDTH	THICKNESS
619	55.5	34.8	8.9
1467	38.4	37.4	5.4
7	57.2	47.6	6.2
21	48.1	41.2	7.0
1134	45.4	30.1	6.4
1145	40.1	27.7	5.4

These items could also be classified as "backed knives" (*couteau à dos*). The final side scraper of note is a very large double convex form (Figure 6.19a). This tool was subsequently recycled. This recycling is indicated by a large, inversely chipped concave edge near one end which removed part of the original convex working edge. Two other apparent notches on this tool are a product of recent plow damage.

Denticulates

This tool class is represented by four items (Table 6.18; Figure 6.20g-i). The tools have thin, irregular, roughly serrated working edges along one (one example) or both (three examples) lateral margins. They seem best interpreted as general "cutting" tools. One item (Figure 6.20h) resembles the denticulates reported by Gramly (1982:41) from the Vail site in that the edge is formed by a series of adjacent, small, half-moon shaped, snaps.

Combination Notch/Borers/Denticulates

This general class of tool includes six items which exhibit several combinations of notches of variable sizes; massive, thick, pointed spurs or borers; and retouched, often denticulated working edges (Figure 6.20a-f; Tables 6.19). It is a widespread class of tool reported from other Parkhill Phase sites such as Thedford II (Deller and Ellis 1992b:68) as well as from sites of other Paleo-Indian phases/complexes such as Crowfield (Deller and Ellis 1996:25), Hi-Lo (Ellis and Deller 1982: Figure 4n, o) and Folsom (Frison and Bradley 1980:109). Undoubtedly the class includes considerable use-variation as it appears to consist largely of expedient, situationally produced, tools.

Retouched Flakes

There are 20 tools in this class which occur largely on biface thinning flakes (4), uniface retouch flakes (2) or channel flakes (12). They consist of simply retouched or used flakes which exhibit a fine (under 2.5 mm long) continuous to discontinuous retouch along one or more margins. On at least two channel flakes, it forms slight notches (e.g. Figure 7.1i). Most of these tools probably represent the expedient use of waste flakes produced during knapping activities carried out on the site. This inference is confirmed in the case of three used channel flake segments. These items represent parts of the flakes which collapsed or broke during flute removal. In these cases, the used segments fit

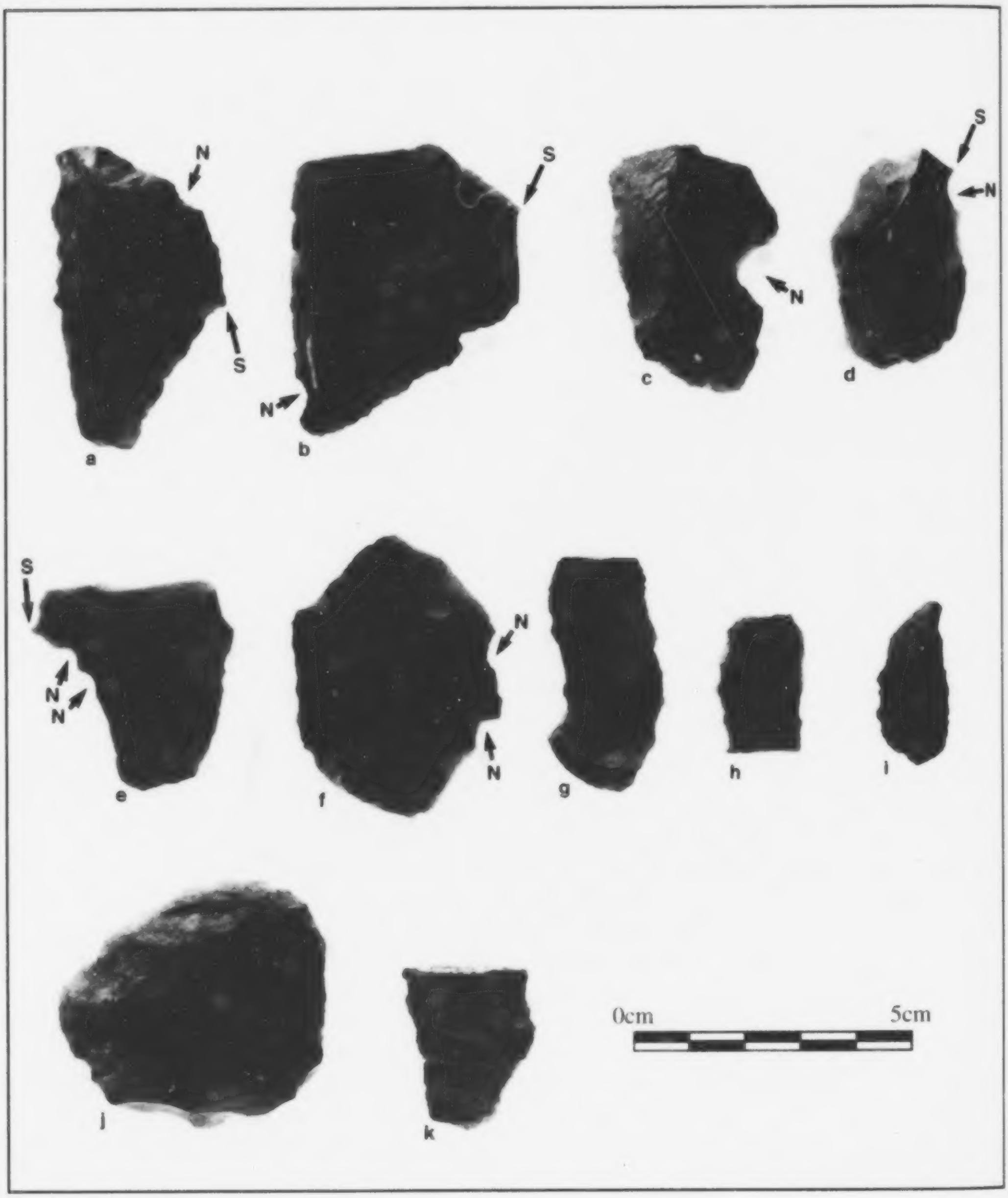
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Figure 6.20: Miscellaneous unifacial tools. a-f: flakes with various combinations of notches, massive spurs or borers, and denticulated edges; g-i: simple denticulates; j: tranvserse convex scraper; k: triangular uniface. N: notch locations; S: spur locations.

Table 6.20: Simple Beaks.

FC#	LENGTH	WIDTH	THICKNESS	BEAK LENGTH	BEAK WIDTH	BEAK THICKNESS	BEAK ANGLE
520*	25.0	32.1	6.7	4.1	9.3	3.0	77.5
353	21.8	16.1	4.7	3.7	6.6	3.6	75.0
1248	38.2	37.7	10.1	5.3	8.2	4.4	70.0
499*	32.6	37.6	10.7	4.7	8.8	4.5	85.0

* recycled forms made on snapped bits of large parallel-sided end scrapers.

Table 6.21: Hafted Perforators.

FC #	LENGTH	WIDTH	THICKNESS	HAFT THICKNESS*	HAFT LENGTH
55	31.5	12.5	7.8	7.2	21.3
1146	-	12.7	6.5	6.5	28.7+

*measured at juncture of stem with narrowed working end.

together with unused channel flake segments recovered from the same site areas. Thus, after their removal from preforms on the site, they were used and then discarded at the same locus. Expedient use is also demonstrated for the two items on uniface retouch flakes. These items can be fit together with a third unused flake (Figure 7.2a) indicating they were removed on the site during the rejuvenation of a single unifacial tool's edge.

Other Unifacial Tools

Simple Beaks (*Becs*)

These tools, which are sometimes referred to as beaked scrapers (Storck 1979:58), are represented by four examples (Figure 6.21c-e; Table 6.20). The working edge consists of a thick, pointed edge buttressed by lateral retouch which resembles a bird's beak in side view. These working edges are usually (3 of 4) formed around pronounced dorsal flake ridges so exact placement on a flake varies. One of the tools has a large notch adjacent to the beak (Figure 6.21c) but this does not appear to be a tool accessory. Rather, by creating a deep notch the beak was lengthened, presumably to continue to use it in a narrow confined space as the beak is continually shortened by reworking and resharpening. Two of the beaks apparently served throughout their use-lives as such tools while two (Figure 6.21d-e) were formed on the snapped bit portion of large parallel-sided end scrapers.

Hafted Perforators

Accumulating data from several sites suggests the presence of a specialized perforator form in the Parkhill Phase (Ellis and Deller

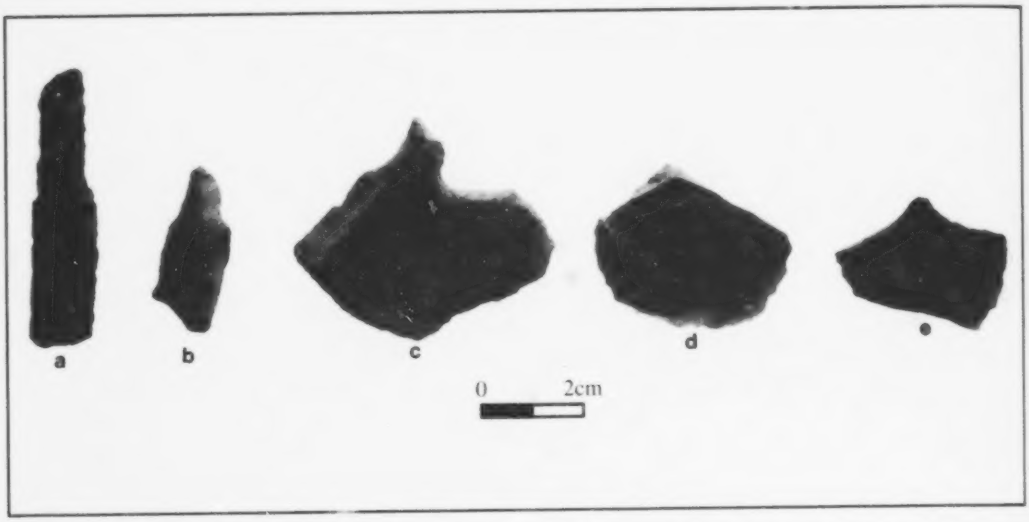

Figure 6.21: Beaks (c-e) and hafted perforators (a-b). d & e are recycled at the proximal end of large, parallel-sided end scraper bits.

1988:119). Two of these items are in the Parkhill collections (Figure 6.11c, 6.21a-b; Table 6.21). Another two are in the McLeod site collections (Ellis and Deller 1988: Figure 5H; Muller 1999). A definite and a possible example of this type are illustrated from the Hussey site (Storck 1979: Plate 17d, 22a). They may also be present at the Fisher site in Ontario (Storck 1997: Plate 3.12i, j), and a definite example occurs in the Potts, New York collection (Gramly and Lothrop 1984:Figure 7k). The author has seen other definitive examples of this type in collections from as far away as Maine.

These tools are elongated in outline with one end deliberately and extensively narrowed. As such, they superficially resemble the tools referred to as limaces or flake-shavers reported from Paleo-Indian sites farther east (cf. Gramly 1982:37-40; Grimes and Grimes 1985). Here, however, the similarity ends. The narrow end of the tools at Parkhill is clearly a working end in contrast to the flake-shavers where it is a hafting modification and lacks a pointed apex. On the tools of concern here, items discarded early in their use-lives (Figure 6.21a) have a very long, narrow working end with extensive steep, bilateral retouch. Through resharpening, the narrowed working end is gradually reduced to a very short segment (i.e. Figure 6.11c, 6.21b; see also Storck 1979: Plate 22a). These tools perhaps served a "perforating" function as there is evidence of attempts to keep the pointed end thin. In particular, on the highly reduced items from Parkhill (see Figure 6.11c), the tip has been thinned in resharpening by a lateral inverse removal. This modification would be necessary if a relatively thin pointed working end was desired as the tools tend to be thicker towards the end opposite the tip.

The wider proximal end on the hafted perforators usually exhibits extensive, lateral, unifacial, dorsal shaping and apparently

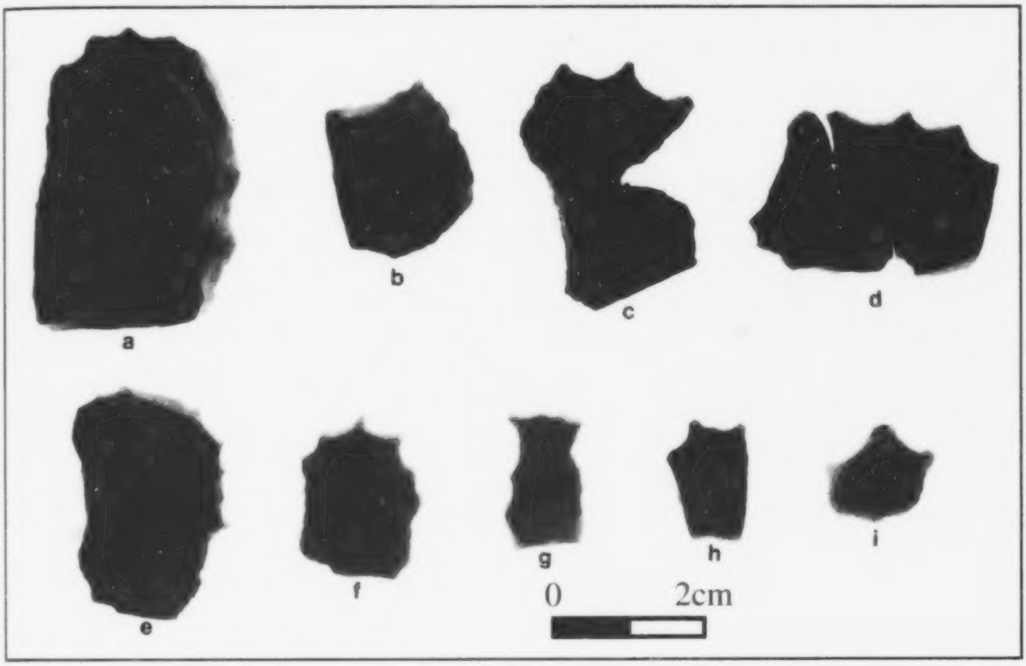

Figure 6.22: Piercers or gravers. a is on alternately retouched side scraper distal end. g-h are on channel flake segments.

represents the hafted end of the tool. It produces slightly tapered lateral edges in plan suitable for insertion in a socket haft. One tool (Figure 6.21a) lacks this lateral retouch probably because it was made on a narrow elongated blank. This tool however, does have extensive bilateral ventral retouch to thin the proximal end for hafting purposes. Unlike flake-shavers which have retouched working edges at the apex of the broadened end, the present tools are unmodified and can exhibit the unaltered platform of the original blank.

Gravers or Micro-Piercers

The distinguishing feature of this tool type is the presence of one or more small, pointed projections or spurs (Figure 6.22). Sixteen items either served throughout their use-lives as such tools or were recycled into such tools prior to final discard. Details on these items are presented separately for the recycled and unrecycled items on Tables 6.22 and 6.23. The six items recycled into these tools include first, four specimens which originally served as hafted trianguloid end scrapers. In three cases, and has been reported from other sites (e.g. Gramly 1982: Plate 23d) a spur was worked into the proximal end (Figure 6.10a-c) while in the fourth, a spur was formed in the centre of the working end (Figure 6.10d). Still another piercer is an alternately retouched one produced at the tip end of a fluted biface fore-section (Figure 5.5i, 5.6c). The final recycled tool (Figure

Table 6.22: Recycled Piercers.

FC#	ORIGINAL FORM	LENGTH	WIDTH	THICKNESS	# OF SPURS
769	Trianguloid End Scraper	34.7	26.0	8.3	1
482	Trianguloid End Scraper	29.7	22.2	6.2	1
213	Trianguloid End Scraper	43.5	25.5	9.4	1
1122	Trianguloid End Scraper	49.8	31.8	8.5	1
406	Double Alternate Side Scraper	38.2	26.3	7.8	4
87	Fluted Biface	38.6	21.7	6.8	1

Table 6.23: Simple Piercers.

FC#	LENGTH	WIDTH	THICKNESS	# OF SPURS	COMMENTS
337	-	16.1	3.5	5	serially used "double scribe"?
408	23.7	20.8	4.5	1	-
466	-	25.5	4.0	4	-
809+	31.0	23.1	2.7	3	"double-scribe"?
1128	29.2	21.2	3.9	8?	-
473	11.8	14.4	1.9	3	"double-scribe"?; on biface thinning flake
1395	17.3	11.3	1.5	3	coronet form; on channel flake
1118	18.2	10.2	1.6	3	on channel flake
815+	30.1	21.4	3.0	4?	-
787	-	-	-	2?	very fragmentary

6.22a) served first as a double alternate side scraper subsequent to which four closely spaced spurs were reworked into one end. As is the case with multiple-spurred non-recycled items to be described below, the thickness of the spurred edge indicates this tool was not a denticulate; that is, the spurs were used at right-angles to the surface being worked rather than sideways in the form of a cutting tool and one might suggest they were used to shred some material such as plant fibres.

The nine simple piercers (Figure 6.22) can have up to eight spurs (Table 6.23). Excepting two alternately retouched forms, the spurs were always produced at Parkhill by normal retouch applied to both sides. Two notable examples (Figure 6.22g-h) are made on channel flake segments. Unlike the samples of these items from sites such as Debert (MacDonald 1968:100), the spurs at Parkhill are rarely formed around dorsal ridges (only 9/36 or 25%) to give them added strength in use.

Three specimens with three spurs (Figure 6.22c, h, i) are good examples of the coronet form reported from sites elsewhere like Debert (MacDonald 1968:100). Recently, Tomenchuk and Storck (1997) have recognized distinctive forms of piercers with two or three spurs they refer to as a "single- and double-scribe compass gravers" respectively. The single scribe items have a more massive central spur and an adjacent less massive spur whereas the double-scribe forms have a central massive spur and on each side, another smaller spur. They argue, based on wear distribution and spur spacing, that the more massive spur on two-spurred items, and the central spur on the three spurred items, was used in a guide or pilot hole. The tool was rotated such that the other spurs could be used to inscribe or cut a circular pattern in bone. The result is that the pilot spur exhibits a pattern of "radially divergent microchips" from its tip, while the cutting spurs exhibit more wear on the side closest to the central spur (e.g. the inside edge). In addition, there is a "continuous band of polish" in the notch between the adjacent spurs and the spacing between the central and outer spurs on three-spurred items is relatively equal (Tomenchuk and Storck 1997:510-513) .

None of the piercers in the Parkhill collection have the two-spurred pattern but the coronet forms were examined to see if they had similar wear. One item, on a channel flake segment, has had its delicate spurs broken so it is not possible to determine aspects of tip and inside wear. For what it is worth, it does not exhibit polish between the notches and the spurs are unequally spaced (5.4 mm and 6.6 mm between the inner and adjacent side spurs). The other two examples, however, including one item on Bayport chert (Figure 6.22c) and another on Collingwood chert (Figure 6.22i), have relatively equal spur spacing (8.2 and 8.3 mm; 7.4 and 7.4 mm, respectively) and conform to the wear descriptions reported by Tomenchuk and Storck (1997): the central spur exhibits radially divergent microchips from the tip, there is continuous polish between the notches, and in at least one instance, there is more inside wear. There is also one item from the site which has five spurs (Figure 6.22f). In this case, the central spur and the two outermost spurs are smaller but the other spurs in between are more massive and also exhibit radially divergent microchips from the tip. Polish is present between all the spurs, the outermost spurs have more inside wear, and the spacing between all spurs is consistent (from 5.4 to 5.6 mm). It may be that this was an item which was serially used with the three adjacent spurs on one side used as a "double-scribe" tool and then, a shifting to use the three spurs on the other side for the same purpose. In such a scenario the central projection would serve in both usages as an outer spur.

Other

Aside from 48 unifacial tool fragments which appear to be largely from side or end scrapers, there are only two other relatively complete tools. One item consists of a transverse convex scraper (Figure 6.20j) which measures 46.9 mm long by 48.7 mm wide by 8.3 mm thick. The distal end has a steep (65-85°), thick (8.6 mm) retouch. These tools occur consistently in limited numbers on Parkhill Phase sites. For example, one occurs at McLeod and one occurs at Thedford II (Deller and Ellis 1992b: Figure 62b; Ellis 1984:227). They seem to be simply a variant of the side scraper class in which, because of the use of a short, broad, flake blank, the working edge occurs on the long distal, as opposed to short lateral, margin.

A second tool on a tertiary top-face blank has a triangular outline (Figure 6.20k) and measures 30.6 by 24.3 by 5.5 mm. The distal end is a naturally steep or abrupt surface at right-angles to the flake's longitudinal section. It was formed when the flake blank removal travelled through and terminated on the flat bottom of the core. This distal end has a fine retouch representing use of the distal end. In addition, one lateral edge has a steep continuous retouch and the other a more acute-angled discontinuous retouch representing use, or modification for "backing," of those edges. In terms of morphology and use of the steep end, this tool is identical to examples of what Parker (1986a, 1986b) called a triangular uniface based on the recovery of 70 such items from the Late Paleo-Indian (Hi-Lo)/Early Archaic Allan site in southcentral Ontario.

Non-Siliceous Items

A number of tools or preforms on non-siliceous items were recovered from the Parkhill site. Many of these, such as 12 celts or adzes, a bannerstone fragment, and three gorget fragments/preforms, clearly relate to post-Paleo-Indian use of the site. Moreover, most of these items were surface finds outside the excavated areas. There were three non-diagnostic items on non-siliceous materials which occurred in the areas excavated at Areas B and D and which may relate to Paleo-Indian use of the site. Evidence of the use of similar tools has been reported from other Paleo-Indian sites. However, we can not be certain these items are associated with the Paleo-Indian occupation as there is evidence of later occupations in both site areas, particularly Area D. Hence, we exclude them from the artifact totals for each area and simply note their presence and provenance here.

One item is a possible, small (49.9 by 47.4 by 24.7 mm), ovoid, hammerstone on a granitic rock recovered from Area B in square 1035/70. Similar items have been recovered from Ontario Paleo-Indian sites such as Caradoc (Deller and Ellis 1998, 1999), Crowfield (Deller and Ellis 1984:48), and Fisher (Storck 1997:86). A second item is a thin slate flake from square 5/450 in Area D. This items exhibits marginal bifacial edge flaking suggesting use as a simple informal cutting tool. A third item from Area D square 25/440 is an iron pyrite concretion. These items originate at the centre of cannonball-like concretions at Kettle Point on the modern Lake Huron just to the northwest of Parkhill (Cooper 1979:12). However, the surface of this item is unmodified and is weathered as is characteristic of concretions from secondary till deposits throughout southwestern Ontario. It may be that it occurred at Parkhill as a natural inclusion. Nonetheless, iron pyrite nodules were used as parts of fire-making kits in later prehistory. An unmodified iron pyrite nodule and what are apparently fragments of a thin slate cutting tool were both recovered as part of a "cache" of Late Paleo-Indian tools at the Caradoc site in Ontario (Deller and Ellis 1998, 1999) making a Paleo-Indian association quite plausible at Parkhill.

CHAPTER 5

FLAKING DEBRIS

Introduction

The flaking debris from the main excavated areas at Parkhill had been examined and previously reported by this author (Ellis 1979; Deller and Ellis 1992a:25-26). However, because of an improved knowledge of lithic raw material types and identification, refinements in analysis, etc. since that time (essentially the benefit of hindsight), the debris has been reanalyzed for the present study and conclusions from the present analysis supercede those of the earlier analyses. The present analysis also differs in that it includes material from peripheral test units and feature float samples which were not previously examined.

The term "flaking debris" as used herein refers to all materials thought to be primarily a product of flint-knapping activities carried out on the site. As such, it includes not only all unmodified lithic pieces but also, a few expedient tools whose blanks are assumed to be a product of site knapping activities. These include tools entirely made on certain flake types to be described below such as channel flakes, which also occur lacking post-detachment modification or use in the site collections. At least some of this "used" debris such as a few channel flakes can be demonstrated to be a product of site flaking activities. For example, three used segments of such flakes with old breaks fit together onto unused segments indicating they were removed and used at the site. The idea this material was produced by knapping activities and then used on site may not hold for all this material. For example, the presence of unmodified channel flakes and biface thinning flakes as presumed grave goods at the Crowfield site suggests some of this debris was curated as blanks for future use at other locations (Deller and Ellis 1984:51). Nonetheless, because these kinds of flakes are predominantly employed for tools with undoubtedly short use-lives, probably the majority were not curated. Thus, they are best included here as a measure of flint-knapping activities on the site. It should be emphasized however, that when debris to tool ratios are calculated below and in other sections of this report, the used items are counted as tools and not debris. It should be noted as well that debris such as "popout" flakes produced by heat exposure are not considered flaking debris and are excluded from the analysis. On the above basis, almost 6000 definite pieces of Paleo-Indian flaking debris were recovered from Parkhill (Table 7.1). This total excludes Kettle Point, sub-greywacke and quartz debris which, as noted earlier, most evidence suggests is not associated with the Paleo-Indian occupation. An exception may be some of this debris recovered from Area C as will be discussed later. Yet, since only 77 flakes from that area of the almost 1400 recovered are on those materials, it is doubted their exclusion will seriously bias the analysis reported here.

The goals of the flaking debris analysis were essentially those expressed in a nascent form in the earlier report (Ellis 1979) and subsequently refined in analyses of other Paleo-Indian debris assemblages by the author (i.e. Deller and Ellis 1992b:79-92; Ellis 1984: Appendix B). The debris was sorted into types primarily significant in yielding information on:

Table 7.1: Total Debris Sample, Parkhill Site.*

DEBRIS TYPE	AREA B	AREA C	AREA D	OTHER	TOTALS
Channel flakes	134(142)	41(42)	15(21)	7(9)	197(214)
Normal biface thinning flakes	44(46)	27	18(19)	-	89(92)
End biface thinning flakes	1(2)	-	1	0(1)	2(4)
Biface reduction errors	11	12	1	-	24
Biface finishing flakes	1592	580	606	1	2779
Normal uniface retouch flakes	28(30)	166	159(160)	-	353(356)
Ventral uniface retouch flakes	1	1	3	-	5
Fragments	1295	532	617	6	2450
Other	12	10	24	-	46
Totals	3118(3131)	1369(1370)	1444(1452)	14(17)	5945(5970)

*totals in brackets include subsequently used items.

1) the stages of lithic reduction carried out on the site; and 2) the kinds of tools (biface, uniface) being altered on the site. This procedure resulted in the recognition of seven debris types and two residual categories. The latter include on the one hand, very fragmentary flakes, and on the other hand, items which, although generally not fragmentary, can not be readily assigned to the types. The attributes and variables for the debris and their method of recording and measurement were largely the same as that given in Chapter 2 for the tool blanks. Exceptions are curvature, banding orientation and platform angle. The small size of the debris prohibited all but impressionistic characterization of these variables. Although all debris was sorted into the types and residual classes, other than lithic material type and weight, detailed data were not recorded for every item. Rather a representative sample of types was selected for detailed data recording and analysis (Tables 7.2 to 7.13). Exceptions are types such as channel flakes which occur in such low numbers that most examples could be examined in detail. It should be emphasized that data were recorded only if a measurement appeared to represent the unaltered flake. For example, in contrast to a previous analysis of the material (Ellis 1979) channel flake width was recorded only where it was certain that this represented the maximum width of such items.

Flake Types

Flakes from Biface Reduction

Normal Biface Thinning Flakes

This type (Table 7.2; Figure 7.11-m) largely includes the "biface thinning flakes" of a previous analysis (Ellis 1979). Differences include: 1) the inclusion of biface trimming flakes previously isolated as a separate type; 2) the exclusion of some items into other types such as end biface thinning flakes and biface reduction error flakes; and 3) the incorporation of material outside the excavated areas and some items made into tool forms like gravers. As well, for this analysis, in order to provide a more accurate type description and to get a better idea of site disturbance, an attempt was made to refit distal fragments lacking platforms onto proximal fragments. A few matches of this nature were found.

Table 7.2: Normal Biface Thinning Flake Data.

VARIABLE	N	RANGE	MEAN	STANDARD DEVIATION
Length	32	13.5-34.2	22.35	5.244
Width	32	12.1-27.1	19.30	4.017
Thickness	64	1.1-4.3	2.28	0.676
Weight	29	0.52-2.0	1.12	0.413
Platform length	85	3.3-13.6	6.78	2.164
Platform width	86	0.8-3.9	1.96	0.708

Table 7.3: End Biface Thinning Flake Data.

VARIABLE	N	RANGE	MEAN
Length	1	22.3-44.4	33.3
Width	2	14.5-16.6	-
Thickness	4	2.4-2.8	2.65
Platform length	3	4.4-8.7	6.07
Platform width	3	1.8-3.1	2.23

Table 7.4: Channel Flake Data.

VARIABLE	N	RANGE	MEAN	STANDARD DEVIATION
Width	86	4.8-16.7	10.96	1.948
Thickness	87	1.0-2.8	1.79	0.388
Platform length	46	2.3-6.3	4.26	1.018
Platform width	47	0.8-2.6	1.56	0.441

As the type name implies, these flakes are derived from the normal or lateral thinning of elongated bifaces. They tend to predominate among the large unmodified debris although all weigh under two grams each. They should not be confused with flakes from biface cores employed as blanks for trianguloid end scrapers and other unifacial tools. Even the smallest of those "core" flakes is much larger than the flakes considered here (i.e. they weigh almost three times as much). Clearly, the thinning flakes are produced in a different manner than those from biface cores. These thinning flakes approximate in size and

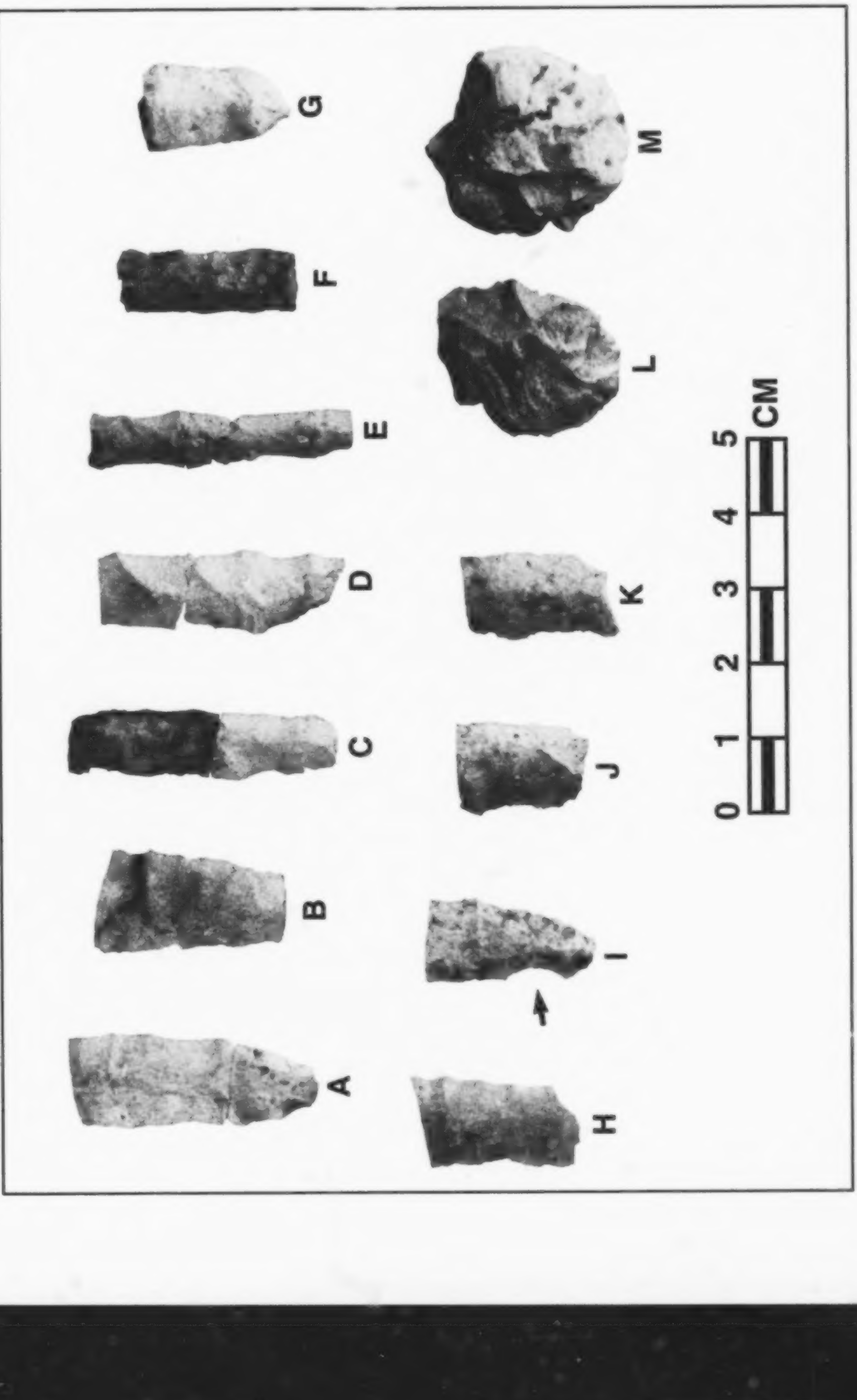
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Figure 7.1: Channel flakes (a-k) and biface thinning flakes (l-m). Arrow shows location of notched edge on channel flake.

morphology the scars on probable unfluted preforms in the assemblage and are probably largely from the thinning of such preforms given that points predominate in the biface tool assemblage. On items on the banded Collingwood chert, banding roughly parallels (44 of 51; 86.2%) the longitudinal axis. This result is to be expected since lateral thinning of point preforms with banding predominantly at right-angles to the longitudinal axis would result in flakes with this form of banding.

The normal biface thinning flakes uniformly exhibit acute-angled, lipped platforms which are highly prepared (Table 7.11). Platforms are often ground and faceted, are frequently reduced and sometimes, are slightly isolated. Excepting those with isolated preparation, the platforms are long and narrow with lens-shaped or lenticular outlines in plan view.

The flakes are thin and usually markedly expanding (Table 7.10) such that width can approximate or exceed length. Bulbs are quite diffuse. The dorsal surface usually has complex bidirectional scar patterns. These scars almost always suggest the removal of previous flakes of a similar large, expanding nature. Exceptions are three flakes which have small, parallel dorsal scars

Table 7.5: Biface Reduction Flake Errors Data.

VARIABLE	N	RANGE	MEAN	STANDARD DEVIATION
Length	16	5.8-22.9	10.46	4.141
Width	18	6.9-21.0	13.04	4.526
Thickness	19	0.3-2.4	1.09	0.606
Weight	16	0.1-1.98	0.43	0.440
Platform length	19	6.9-19.1	12.13	3.921
Platform width	20	2.0-5.8	3.84	1.351

Table 7.6: Biface Finishing Flake Data.

VARIABLE	N	RANGE	MEAN	STANDARD DEVIATION
Length	32	4.4-16.6	10.69	3.262
Width	86	3.4-13.2	7.65	2.276
Thickness	98	0.1-1.6	0.78	0.332
Weight	28	0.01-0.33	0.14	0.095
Platform Length	95	1.1-6.6	3.49	1.170
Platform Width	99	0.1-2.1	0.86	0.428

Table 7.7: Normal Uniface Retouch Flake Data.

VARIABLE	N	RANGE	MEAN	STANDARD DEVIATION
Length	94	4.4-17.7	9.43	2.538
Width	98	4.3-17.7	9.36	2.889
Thickness	99	0.4-4.2	1.77	0.861
Weight	94	0.04-0.84	0.231	0.145
Platform Length	94	1.1-7.0	2.937	1.376
Platform Width	94	0.4-3.2	0.984	0.522

similar to those which would be produced by later biface finishing flake (see below) removals. These thinning flakes seem to have been removed after general thinning was completed and biface finishing was begun, perhaps to correct knapping errors. Elsewhere (Deller and Ellis 1992b:83), such flakes have been singled out as a discrete type referred to as "biface thinning in retouch" flakes. Five other items are notable in that they have small dorsal remnants of the original flake blank surface used for biface production. Curvature is generally slight to moderate and symmetrical (Tables 7.12, 7.13). A few have relatively pronounced distal curvature. Some have little or no curvature. It seems possible that these last-named items are derived earlier in the sequence of preform thinning. They may be a product of the removal of flakes from the flat or more "plano" surfaces of preforms which still retain some of the cross-section of the original flake blank. One pair of these flakes were found which fit together indicating they were removed from the same biface.

Table 7.8: Ventral Uniface Retouch Flake Data.

VARIABLE	N	RANGE	MEAN
Length	4	7.8-12.1	10.98
Width	5	9.5-16.4	12.96
Thickness	5	0.8-2.3	1.44
Weight	4	0.17-0.49	0.323
Platform length	5	3.8-9.8	4.86
Platform width	5	1.3-2.8	2.00

Table 7.9: Termination Types, Debris Types.

TYPE	N	FEATHER	HINGE/STEP	INCOMPLETE
Normal biface thinning flakes	90	28 (31.1%)	4 (4.4%)	58 (64.4%)
End biface thinning flakes	4	2 (50.0%)	1 (25%)	1 (25%)
Biface reduction errors	20	11 (55%)	6 (30%)	3 (15%)
Biface finishing flakes	100	28 (28%)	2 (2%)	70 (70%)
Normal uniface retouch flakes	100	89 (895)	6 (6%)	5 (5%)
Ventral uniface retouch flakes	5	0 (0%)	4 (80%)	1 (20%)

End Biface Thinning Flakes

Flakes of this type (Table 7.3) consistently occur in small numbers on fluted point sites. As opposed to the normal biface thinning flakes, they are removed from the end rather than lateral edge of the biface. Therefore, they tend to lack curvature (Table 7.12), are

Table 7.10: Lateral Edge Orientation, Debris Types.

TYPE	N	PARALLEL	CONTRACTING	EXPANDING
Normal biface thinning flakes	90	2 (2.2%)	-	88 (97.8%)
End biface thinning flakes	4	1 (25%)	1 (25%)	2 (50%)
Biface reduction errors	19	-	18* (94.7%)	1 (5.3%)
Biface finishing flakes	100	87 (87%)	-	13 (13%)
Normal uniface retouch flakes	100	15 (15%)	2 (2%)	82 (82%)
Ventral uniface retouch flakes	5	5 (100%)	-	-

* five of these flakes contract only on one lateral edge while the other is straight or expanding.

Table 7.11: Platform Surfaces/Preparation, Debris Types.

TYPE	N	GROUND	FACETED	REDUCED	ISOLATED	FLAT	DIHEDRAL
Normal biface thinning flakes	88	88 (100%)	70 (79.6%)	39 (44.3%)	15 (17.1%)	6 (6.8%)	10 (11.4%)
End biface thinning flakes	3	3 (100%)	3 (100%)	-	3 (100%)	-	-
Biface reduction errors	20	14 (70%)	13 (65%)	13 (65%)	1 (5%)	3 (15%)	4 (20%)
Biface finishing flakes	100	91 (91%)	58 (58%)	7 (7%)	-	1 (1%)	41 (41%)
Normal uniface retouch flakes	97	-	1 (1.0%)	-	-	91 (93.8%)	5 (5.2%)
Ventral uniface retouch flakes	5	-	5* (100%)	-	-	-	-

*these items also have short step or hinge terminated flake scars on the platform presumably from previous use of the tool edge.

Table 7.12: Curvature, Debris Types.

TYPE	N	NONE/FLAT	SLIGHT	MODERATE	PRONOUNCED
Normal biface thinning flakes	52	7 (13.5%)	26 (50%)	15 (28.9%)	4 (7.7%)
End biface thinning flakes	4	4 (100%)	-	-	-
Biface reduction errors	20	20 (100%)	-	-	-
Biface finishing flakes	70	3 (4.3%)	63 (90.0%)	4 (5.7%)	-
Normal uniface retouch flakes	96	3 (3.1%)	26 (27.1%)	31 (32.3%)	36 (37.5%)
Ventral uniface retouch flakes	5	5 (100%)	-	-	-

more often parallel-sided beyond the platform area, have transverse dorsal scars (produced by previous lateral thinning) and have (3 of 3) right-angled Collingwood chert banding. As such, they can be and have been confused with channel flakes (see below) in some of the Paleo-Indian literature. However, they can be easily distinguished from channel flakes because of a generally larger size and much more massive transverse dorsal scars. Platforms are highly prepared and are uniformly isolated. They are consistently the largest form of waste produced on sites away from lithic source areas and as such, are frequently employed as expedient tools.

Channel Flakes

Including items subsequently used as tools, some 242 fragments of these flakes were recovered. After refitting, this total reduces to 214 separate items. Even excluding those that were subsequently employed as retouched flakes, small points and two gravers, the total recovered (N=197 including three segments which fit together with subsequently used specimens) is the largest reported for an eastern North American site excepting the Fisher site which yielded around 1000 items (Storck 1997: Table 2.3).

These flakes are derived in fluting and are quite distinctive. They are long, parallel-sided to slightly expanding flakes with lenticular or plano-convex cross-sections (Figure 7.1a-k; Table 7.4). They lack longitudinal curvature and have small, roughly parallel-sided, transverse dorsal scars as a result of their removal from ends, rather than lateral edges, of the biface. An exception to the latter characteristic are five fragments which have a single scar following the longitudinal axis of the flake and which represent secondary removals from double-fluted points. None of the items

Table 7.13: Curvature Placement, Debris Types.

TYPE	N	SYMMETRICAL	DISTAL
Normal biface thinning flakes	48	36 (75%)	12 (25%)
End biface thinning flakes	-	-	-
Biface reduction errors	-	-	-
Biface finishing flakes	67	60 (82.0%)	17 (17.9%)
Normal uniface retouch flakes	93	17 (18.3%)	76 (81.7%)
Ventral uniface retouch flakes	-	-	-

recovered are complete because they tend to collapse in removal. The longest segment (in three pieces) is 41.5 mm long. Sixty-two of the segments are proximal ends. There is a tendency for breakage in removal to occur near the platform (at ca. 10 mm). This makes platform ends difficult either to identify or to recover using 1/4" mesh so they are undoubtedly under-represented. Platforms are always highly pointed or isolated, faceted, and ground and their surfaces are at roughly a 45-60° angle to the dorsal surfaces of the flake.

Only 15 fragments are distal ends. These can be recognized because they have feathered or hinge terminations. However, the points and preforms suggest channel flake step terminations were common but these are difficult to distinguish from simple snaps during removal. Therefore, the remaining 137 specimens classed as medial fragments, some of which have been altered in use, may include some distal portions.

A thorough attempt was made to fit channel flakes onto fluted bifaces in the assemblage. As is discussed more in other sections, two matches were made with preforms and three with points recovered from the site.

Biface Reduction Error Flakes

These flakes (Table 7.5) are produced as a result of errors in biface knapping. Due to an improperly prepared platform, the application of too much force in the detaching blow and other factors, the edge of the biface collapses when struck. This process results in a generally very short flake with a very large platform relative to overall flake size. Frequently, a hinge or step termination also results (Table 7.5). Excluding one markedly expanding specimen, one or both lateral edges contract from the platform (Table 7.10). In sum, the platform length is often the widest point of the flake. The removals of these flakes would leave a concavity or "bite" on the biface edge. One would expect as well, that the biface would often split by a perverse fracture. Some of these flakes with very large platforms apparently represent errors during biface thinning while those with smaller platforms are probably produced largely in biface finishing. Overall, and as a mark of flint-knapping excellence, this flake type is relatively rare in Paleo-Indian assemblages versus successfully removed flakes.

Biface Finishing Flakes

This type (Table 7.6) is the most common one on the site produced during biface reduction. They are small, thin, relatively

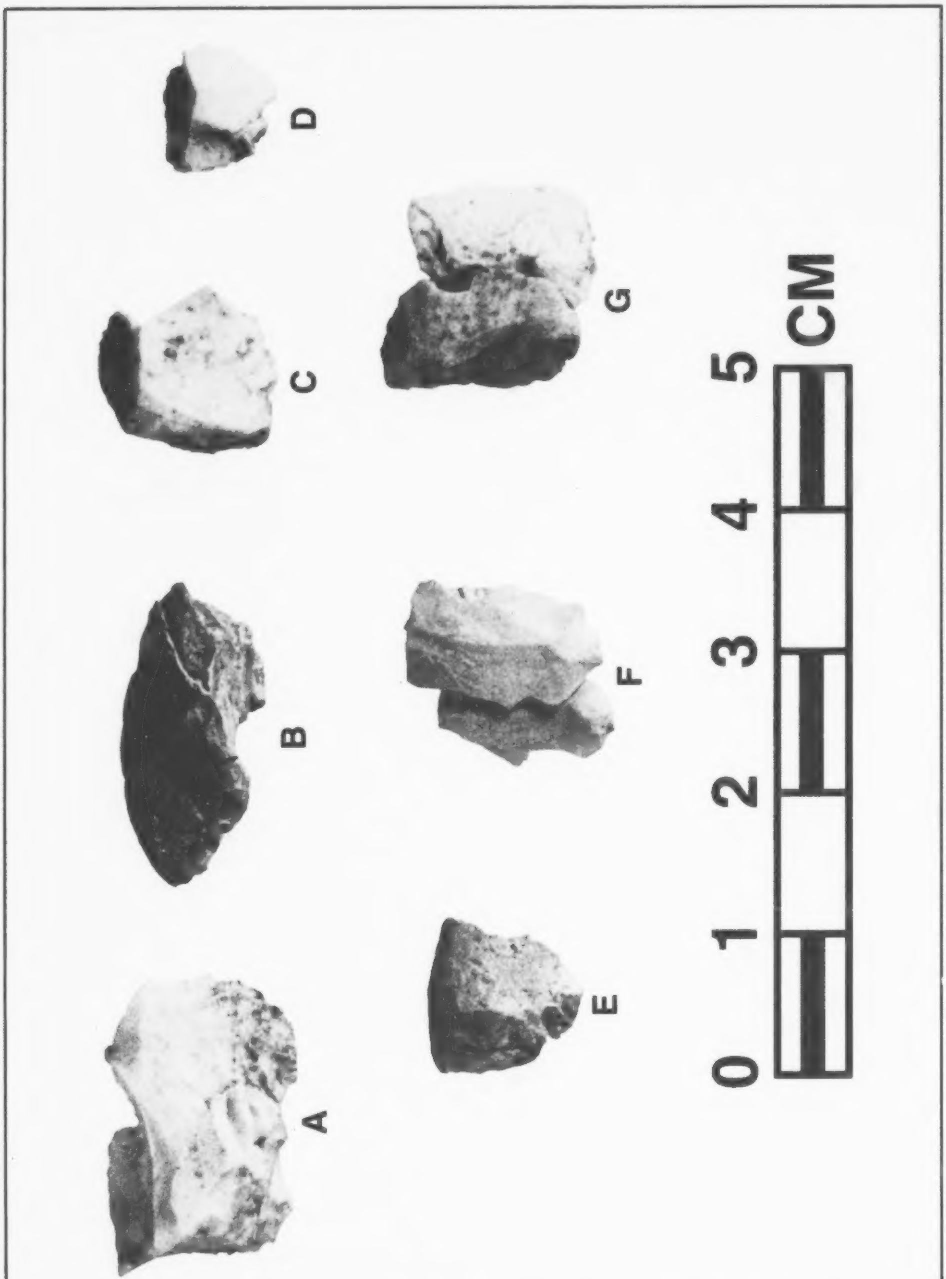

A
B
C
D
E
F
G
0
1
2
3
4
5
CM

Figure 7.2: Refitted sets of normal uniface retouch flakes (a-e) and biface finishing flakes (f-g).

parallel-sided flakes with acute-angled platforms. Most examples are fragmentary (Table 7.9) due to collapse in removal or site plowing. Because of their small size and incompleteness, they are difficult to recover in 1/4" mesh and so, are undoubtedly under-represented. Platforms tend to be lenticular in outline and lipped, are almost always ground and have either faceted or dihedral surfaces (Table 7.11). The common occurrence of dihedral platforms suggests platforms were not always prepared by techniques such as edge-beveling. Longitudinal curvature is usually slight and symmetrical. Most of these flakes are probably a product of the finishing stages of point manufacture. In size and outline shape they approximate the parallel collateral flaking scars on fluted points and preforms. However, some are probably a product of trimming in earlier stages of biface manufacture and from edge rejuvenation. Although no concerted effort was made to find overlapping sets of these flakes removed from the same biface, three re-fitted pairs were found during the sorting into types (e.g. Figures 7.2f-g). These are clearly a product of the patterned collateral retouch as is evident on the points and preforms.

Flakes from Uniface Reduction

Normal Uniface Retouch Flakes

These small, thick, generally expanding flakes are produced during the alteration of unifacial tool edges (Table 7.7; Figure 7.2a-e). They were first recognized in Paleo-Indian, of for that matter, New World assemblages, by Witthoft (1952:479, Plate 4: 4 & 5). Both Jelinek (1965) and Frison (1968) provide excellent descriptions of their essential characteristics. These flakes are probably largely a product of edge rejuvenation rather than manufacture per se. They were detached by directing force against the flat, unflaked, primarily ventral surface of the tool blank. Thus, they tend to have flat platforms (Table 7.11). Adjacent to the platform on the dorsal surface is a segment of the old used portion of the tool edge. This segment usually exhibits a series of short overlapping hinge or step terminated removals which produce a "scalar" surface. These removals are probably a product of prior use of the edge. During detachment, the uniface retouch flakes tend to extend and feather out beyond the length of previous removals. As a result, on the dorsal surface at the distal end, there is often (72.63%) a small, flat, facet (see especially Figures 7.2c-d) which represents part of the old, previously unmodified, flat, back of the tool.

Other than the foregoing characteristics, these flakes vary somewhat. This variation is largely a product of whether or not the flake was removed early or late in the alteration of a tool's edge and hence, whether or not they were removed from an acute, or as edge rejuvenation progresses, steeply retouched edge. Those removed early in the life of an edge tend to be less curved with symmetrical curvature being more common. They have larger, more lenticular-shaped, more acute-angled, lipped platforms; do not expand much; are thinner with diffuse bulbs; and often lack a well-defined back facet at the distal end. In contrast, flakes removed later from an edge have more right-angled, frequently unlipped, more circular to irregular shaped and smaller platforms; are thicker with pronounced distal curvature where the distal end encountered the abrupt, well-defined beveled edge/back juncture during removal; tend to be more expanding in outline; and have more pronounced bulbs.

It was possible in several instances to refit sets of two or three of these flakes removed in the alteration of the same edge of a tool (Figures 7.2a-e). Most of these sets appear to be the product of a single resharpening episode. One exception is a set of two flakes which when fit together, overlap in a manner which suggests each of the refitted flakes represents a different edge rejuvenation episode (Figure 7.2b). Two items in another refitted set (Figure 7.2a) were used as tools subsequent to being detached from a uniface. Another three of these flakes were found which fit onto uniface edges in the collection (i.e. Figure 6.9g) and which leave little doubt as to their origin in uniface retouching.

Ventral Uniface Retouch Flakes

This rare type is represented by only five examples (Table 7.8). In contrast to the flakes in the previous type they were removed from the flat underside of the unifacial tool form which had been previously retouched only on the opposite face. The platform used for removal was the surface of the old beveled edge on that opposite face. Hence, although not a product of purposeful preparation, platforms are faceted, the facets being a product of scars formed by the previous dorsal retouch. As well, the platforms, as part of the old beveled margin, exhibit short, hinge or step terminated overlapping scars which are probably a product of previous use of that beveled margin. Since the flakes are removed from flat surfaces, they lack curvature, have a dorsal surface which is wholly or partially unflaked, are markedly expanding, tend to be short and often, hinge or step terminate (Table 7.9).

Flake Fragments

The vast majority of the debris from the site is simply medial and distal fragments lacking platforms. All these fragments are of a uniformly small size. It seems a certainty that these are largely fragments of flakes produced in biface reduction -- particularly biface finishing and biface thinning flakes. Channel flakes are relatively easy to recognize in the absence of platforms so few if any are classed as fragments. Uniface debris pieces are almost certainly rare in the fragmentary material as indicated by the relative completeness of all uniface debris flakes in the assemblage as compared to biface debris, especially biface finishing flakes (Table 7.9). The uniface retouch flakes tend to be short and thick. Thus, they are less often subject to breakage either in removal or by post-depositional disturbances such as plowing. This interpretation is also supported by data from other sites. For example, at sites such as McLeod (Ellis 1979) where uniface debris predominates versus identifiable biface debris, flake fragments are very rare (see also Muller 1999).

Other Flaking Debris

The remaining debris includes a few, mainly complete items which can not be placed into the types described above. By extension, they can not be easily assigned to the reduction of certain classes of tools or to stages of manufacture. Two possible exceptions are similar to the uniface retouch flakes. Similarities include relatively right-angled, flat platforms, pronounced bulbs, expanding lateral edges and quite thick, curved, cross-sections. They differ from the uniface retouch flakes in that they are quite large (>1 gm each) and lack any dorsal retouch scars suggesting previous retouching of an edge or a "scalar" retouch indicative of previous use of the edge. It seems possible that these two flakes represent the trimming of unifacial tool blanks for hafting. In particular, they resemble in size and outline shape the kinds of flakes we would expect to be produced by the lateral trimming of some of the larger trianguloid end scrapers in the sample (e.g. Figure 6.19a, b). Another possible exception is a platform segment from a relatively large flake. This specimen may represent an example of platform trimming/removal for hafting purposes as is evident on some end scrapers in the assemblage.

Conclusions

The most notable aspect of the flaking debris is its extremely small size. Only 29 flakes weighed over 1 gm each and these are almost exclusively from biface preform thinning. All debris is clearly from the later stages of tool manufacture such as biface thinning and retouching as well as from resharpening. In short, and as seems to be the case throughout the Northeast at sites quite removed from lithic sources (> ca. 30 km), the primary stages of manufacture were not carried out at the site. Rather, material was transported to the site as flake blanks, preforms and finished tools. Since the earlier stages of reduction produce much unuseable debris, restriction of primary manufacturing to immediate source areas obviates the necessity of transporting unnecessary lithic bulk to locations of tool use. This practice would be especially important in Paleo-Indian industries given the large distances materials were being transported and its implications have been discussed in considerable detail elsewhere (Deller and Ellis 1992b; Ellis 1984:419-495).

PART III: SITE AREAS AND OVERALL LAYOUT

by D. Brian Deller and Christopher Ellis

CHAPTER 8

AREA B

Introduction

This area is the northernmost of four artifact concentrations situated in a roughly linear array some 500 to 600 ft. northeast of the inferred 605' strandline level of Lake Algonquin. It is on the northwestern slope of a slight east to west ridge which crosses the site (Figures 1.3 and 12.1).

Area B was the most extensively investigated at the site. Some 87 five foot squares (2175 sq. ft.) were excavated (Table 1.1; Figures 1.3 and 8.1). Almost all squares were dug in a consistent manner with respect to screen size. The top 0.2 ft. in the plowzone was passed through 1/8" mesh while all other depths were screened through 1/4" mesh. The only exception was the first two squares excavated (1025N/45E; 1030N/75E) where 1/8" was not employed.

Most squares were excavated in one continuous block unit. However, several peripheral test squares were also excavated. Excluding the northeasternmost of these peripheral units (1045N/140E), all yielded Paleo-Indian materials. Combined with surface plotted material outside the excavated area, this evidence indicates the area of Paleo-Indian activity extends almost to the 0E base-line on the west and covers up to three times that excavated (up to ca. 6000 sq. ft.).

Artifact Assemblage

Tools/Preforms

Some 102 separate Paleo-Indian tools/preforms and fragments thereof were recovered from Area B (Table 8.1). Of this total, 96 (90.2%) came from within the excavated area. Most of these artifacts are on Collingwood chert with only a few Bayport and Onondaga specimens represented (Table 8.1).

Almost 70% of the artifacts are fluted bifaces, most of which are from finished points (Table 8.1). Of these, broken basal sections and ears (i.e. items lacking tip segments) are by far the predominant form (82.8%; Table 5.1). This evidence is strongly suggestive of an emphasis on projectile use and also indicates that point rehafting was a major activity. One finished point (Figure 5.5a) was broken at the tip and the large basal section was modified bifacially along one edge suggesting recycling. Two other bifaces which cannot be assigned to the point or preform category were also recycled. One has an alternately retouched spur or graver at the tip (Figure 5.6c). Another is a fluted point blade or fore-section which was modified and used as a cutting tool.

Only eight items are fluted preforms. Most of these are small tip fragments or, in one case, a basal fragment, removed by outre-passé flute terminations. The remainder of these items were not recovered and excepting perhaps the basal fragment, this strongly suggests that these minor breaks did not impair the finishing of the preforms into points. Indeed, only one relatively complete preform (Figure 5.11a) was recovered, indicating discard in manufacture although as noted in earlier discussions, Roosa (1977b) thought this one item may be a reworked point rather than a preform.

Other bifacial items are rare at Area B. Moreover, excluding two marginally retouched bifaces, a small alternately beveled biface and two fragments, these other items are also related to point production and use. They include two unfluted preforms and four small points or fragments thereof made on channel flakes. Amongst the latter, all broken in post-Paleo-Indian times, are one tip end, two mid-sections, and one relatively complete item.

As for unifacial tools, only 17 were recovered if we exclude the fluted biface recycled into a graver and three small tool fragments. The unifaces include one large parallel-sided end scraper bit and two side scrapers. Both of the latter are single convex forms with relatively steep retouch along one edge. However, they also exhibit fine, intermittent flaking on the opposite lateral edge. Therefore, as noted in earlier discussions, they could also be regarded as backed knives. Moreover, one of the marginally retouched bifaces (Figure 5.17b) also could be regarded as a backed knife, even though, in that case, the working edge opposite the backing is more extensive and bifacial. Most of the unifacial tools are simple, expedient, retouched flakes. Two of these are on relatively large uniface retouch flakes with the working edges at the distal end and these fit together with a third indicating they were removed from the same tool edge and on the site. Hence they were used expediently. The remaining retouched flakes are on the by-products of point manufacture such as an end biface thinning flake, normal biface thinning flakes (N=2) and channel flakes (N=7). Of the last named, three used segments with old breaks fit together with unused fragments in the assemblage suggesting they were selected and used on the spot from the available debris.

Flaking Debris

After refitting, and including those items such as retouched flakes and channel flake points which were expediently used, 3118 pieces of definite Paleo-Indian flaking debris were recovered from Area B (Table 8.2). The exact employment of 1/8" mesh at Area B contrasts with that in other site areas. Moreover, most other sites in the Northeast have been dug with 1/4" mesh alone. Therefore, in order to standardize the totals for inter-area and inter-site comparisons in later sections, all material from Area B recovered in 1/8" mesh or the finer meshes employed in floatation was resieved in the lab through 1/4" mesh. The micro-flakes which passed through this mesh were excluded and the resulting revised totals for Area B are given on Table 8.3.

The above debris totals exclude 56 flakes on Kettle Point chert (N=46), the meta-sediment sub-greywacke (7) and quartzite (3). It is possible that some of this material is Paleo-Indian associated. For example, there is some evidence of the minor use of sub-greywacke by Paleo-Indian knappers at the Thedford II (Deller and Ellis 1992b:87) and Culloden Acres (Ellis and Deller 1991:19-20) sites. Also, at the Fisher site there is some evidence for minor use of Kettle Point chert

Table 8.1: Tool/Preform Totals, Area B.*

TYPE/CLASS	COLLINGWOOD	ONONDAGA	BAYPORT	UNKNOWN	TOTALS
Fluted Points	52 [89.7%]	1 [1.7%]	4 [6.9%]	1 [1.7%]	58
Fluted Preforms	7 [87.5%]	-	1 [12.5%]	-	8
Other Fluted Bifaces	4 [100%]	0(1)	-	-	4(5)
Unfluted Preforms	2 [100%]	-	-	-	2
Channel Flake Points	4 [100.0%]	-	-	-	4
Large Alternately Bevelled Bifaces	-	-	-	-	-
Small Alternately Bevelled Bifaces	1 [100%]	-	-	-	1
Backed Bifaces	-	-	-	-	-
Marginally Retouched Bifaces	2 [100%]	-	-	-	2
Biface Fragments	1 [50%]	1 [50%]	-	-	2
Trianguloid End Scrapers	-	-	-	-	-
Large Parallel-Sided End Scrapers	1 [100%]	-	-	-	1
Laterally Notched End Scrapers	-	-	-	-	-
Fluted End Scrapers	-	-	-	-	-
Bi-Bitted End Scrapers	-	-	-	-	-

Table 8.1: Continued.

TYPE/CLASS	COLLINGWOOD	ONONDAGA	BAYPORT	UNKNOWN	TOTALS
Narrow End Scrapers	-	-	-	-	-
Offset End Scrapers	-	-	-	-	-
Other End Scrapers	-	-	-	-	-
Simple Beak	-	1 [100%]	-	-	1
Hafted Perforator	1 [100%]	-	-	-	1
Piercers or Gravers	-	1 [100%]	-	-	1
Denticulate	-	-	-	-	-
Notch/Borer/ Denticulate	-	-	-	-	-
Concave Side Scrapers with Spurs	-	-	-	-	-
Other Side Scrapers	2 [100%]	-	-	-	2
Retouched Flakes	12 [100%]	-	-	-	12
Other Unifaces & Fragments	3 [100%]	-	-	-	3
Totals	92 [90.2%]	4(5) [3.9%]	5 [4.9%]	1 [1.0%]	102 (103)

* totals in rounded brackets includes items counted in their original and recycled form.

(Storck 1997:45). However, at Parkhill Area B, there are data which suggest most, if not all, of this material is not Paleo-Indian associated. This debris, concentrates in different areas than the definite Paleo-Indian flaking debris, occurring roughly on the periphery of the main excavated area such as along the eastern edge and to the northwest (compare Figures 8.2 and 8.3). Moreover, later diagnostics were recovered from all these areas (Figure 8.4). These included

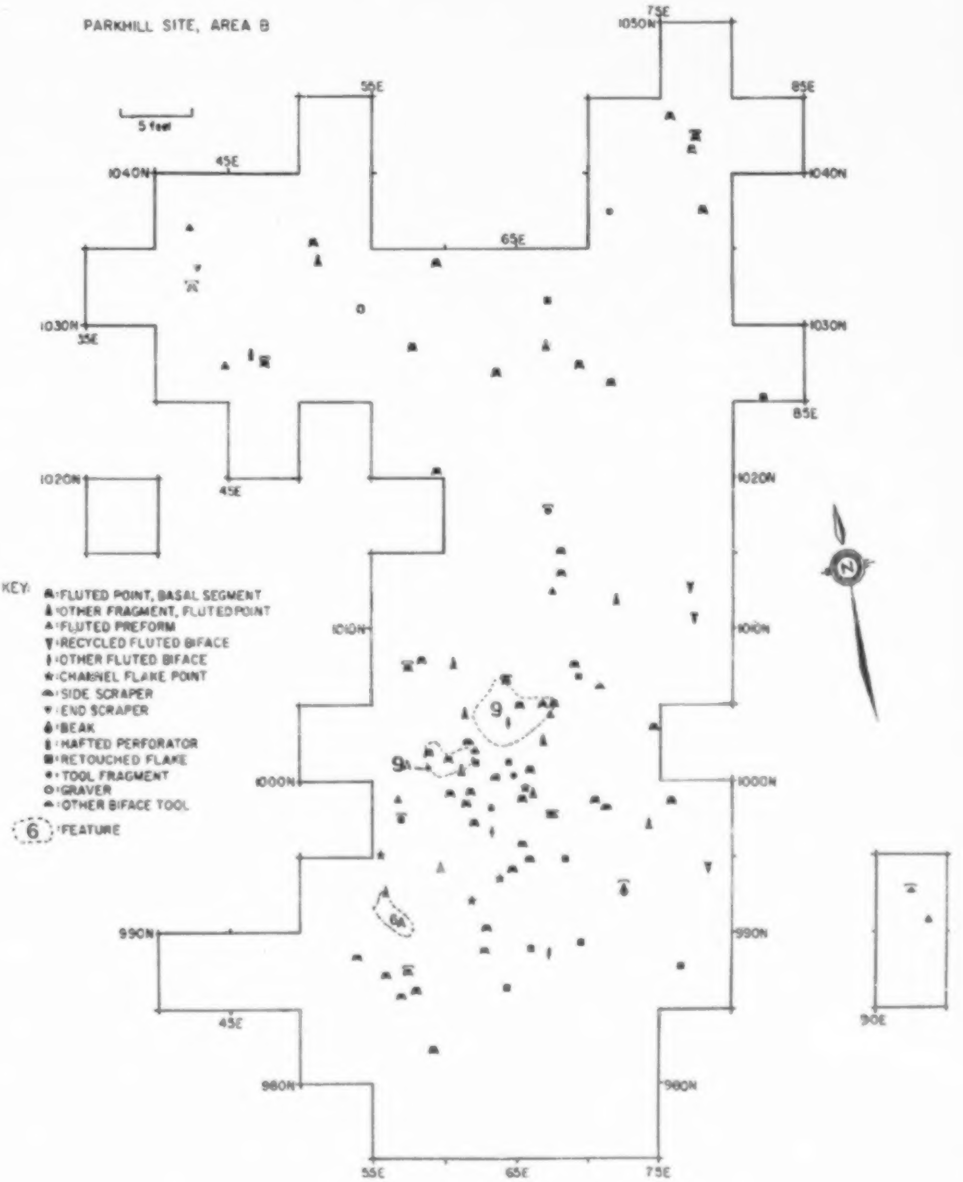

PARKHILL SITE, AREA B
5 feet
1050N
75E
55E
85E
1040N
45E
65E
1030N
35E
85E
1020N
45E
1010N
1000N
990N
45E
980N
55E
65E
75E
90E
N
KEY:
▲:FLUTED POINT, BASAL SEGMENT
▲:OTHER FRAGMENT, FLUTED POINT
▲:FLUTED PREFORM
▼:RECYCLED FLUTED BIFACE
▮:OTHER FLUTED BIFACE
★:CHANNEL FLAKE POINT
▲:SIDE SCRAPER
▼:END SCRAPER
▲:BEAK
▮:HAFTED PERFORATOR
■:RETOUCHED FLAKE
●:TOOL FRAGMENT
○:GRAVER
▲:OTHER BIFACE TOOL
6 :FEATURE
9
9A
6A

Figure 8.1: Tool/preform and feature distributions, area B. "Hatted" items are approximate locations.

Table 8.2: Debris Totals Area B Including 1/8" mesh & Flotation Samples.*

DEBRIS TYPE	COLLINGWOOD	ONONDAGA	BAYPORT	UNKNOWN	TOTALS
Channel flakes	124(132) [92.5%]	2 [1.5%]	6 [4.5%]	2 [1.5%]	134(142)
Normal biface thinning flakes	39(41) [88.6%]	-	5 [11.4%]	-	44(46)
End biface thinning flakes	1(2) [100%]	-	-	-	1(2)
Biface reduction errors	10 [90.9%]	-	1 [9.1%]	-	11
Biface finishing flakes	1519 [95.4%]	33 [2.1%]	33 [2.1%]	7 [0.4%]	1592
Normal uniface retouch flakes	25(27) [89.3%]	-	3 [10.7%]	-	28(30)
Ventral uniface retouch flakes	1 [100%]	-	-	-	1
Fragments	1253 [96.8%]	15 [1.2%]	21 [1.6%]	6 [0.5%]	1295
Other	12 [100%]	-	-	-	12
Totals	2984(2997) [95.7%]	50 [1.6%]	69 [2.2%]	15 [0.5%]	3118 (3131)

*totals in rounded brackets include used items.

seven, probably Late Woodland, body sherds recovered along the eastern margins from 980N to1020N and in peripheral square 985/90, point fragments and fragments of several other later tools from the southwest and northwest part of the main excavation block and, in the northwest area, early historic materials including a pistol ball and a pipe fragment. Finally, none of this debris was recovered from intact Paleo-Indian features in the area, although this could simply reflect sampling error given the low incidence of such materials.

In general, the definite Paleo-Indian flaking debris is consistent with the tool/preform assemblage in that it is highly dominated by Collingwood chert items and by the by-products of biface reduction. Of course, biface reduction produces much more debris than the reduction (largely resharpening) of unifaces (Collins

Table 8.3: Debris Totals Area B Excluding 1/8" & Flotation Items.

DEBRIS TYPE	COLLINGWOOD	ONONDAGA	BAYPORT	UNKNOWN	TOTALS
Channel flakes	113(121) [92.6%]	2 [1.6%]	5 [4.1%]	2 [1.6%]	122(130)
Normal biface thinning flakes	39(41) [88.6%]	-	5 [11.4%]	-	44(46)
End biface thinning flakes	1(2) [100%]	-	-	-	1(2)
Biface reduction errors	10 [90.9%]	-	1 [9.1%]	-	11
Biface finishing flakes	1012 [95.6%]	22 [2.1%]	23 [2.2%]	2 [0.2%]	1059
Normal uniface retouch flakes	20(22) [86.9%]	-	3 [13.0%]	-	23(25)
Ventral uniface retouch flakes	1 [100%]	-	-	-	1
Fragments	643 [95.9%]	10 [1.5%]	13 [1.9%]	4 [0.6%]	670
Other	12 [100%]	-	-	-	12
Totals	1851(1864) [95.2%]	34 [1.8%]	50 [2.6%]	8 [0.4%]	1943 (1956)

1975:32). However, excluding the smaller items which would be recovered only in 1/8" mesh, biface debris accounts for 98.1% of the debris assignable to either biface or uniface reduction. This total is higher than that at other Parkhill site areas (see below) and is in line with the higher percentage of bifaces per se at this locus. Moreover, because biface reduction produces more debris per tool or preform than uniface reduction, one should generally expect relatively high debris to tool ratios at sites where the former was emphasized. Table 8.4 gives the biface percentages and debris/tool ratios for various sites and site areas in the Northeast where comparable excavation techniques were employed. Clearly, at those sites where bifaces dominate the tool/preform assemblage there are higher debris to tool ratios. Area B, with a ratio of over 20 to 1, fits comfortably into this pattern. It is notable however, that Area C has a higher ratio than Area B, even though bifaces are more common at B. This anomaly will deserve additional discussion in the next chapter.

Table 8.4: Biface Percentages and Debris to Tool Frequency Ratios at Northeastern Paleo-Indian Sites Excavated Using 1/4" Mesh.[1]

SITE OR SITE AREA	BIFACE PERCENTAGE[2]	DEBRIS TO TOOL RATIO[3]
Vail A	6.5	2.2 to 1
Vail B	5.6	1.5 to 1
Vail C	11.5	1.6 to 1
Vail D	4.2	1.2 to 1
Vail E	3.6	1.9 to 1
Vail F	7.6	3.0 to 1
Vail G	1.2	1.2 to 1
Vail H	5.0	1.6 to 1
Vail Total	4.7	1.5 to 1
Potts A	1.0	3.1 to 1
Potts B	0.9	8.1 to 1
Twin Fields	4.1	8.6 to 1
Bolton	52.9	10.2 to 1
Holcombe	82.3	17.0 to 1
Parkhill B[4]	79.4	20.2 to 1
Parkhill C[4]	50.9	23.3 to 1
Parkhill D[4]	23.5	9.1 to 1
Barnes	70.0	48.0 to 1

[1]: tool/preform fragments are included in calculations of ratios. Data derived from Eisenberg 1978; Fitting et al. 1966; Gramly 1982; Gramly and Lothrop 1984; Voss 1977.

[2]: includes *pièces esquilées* as unifaces.

[3]: excludes non-flaking debris such as "potlids."

[4]: excludes surface-collected materials from outside the excavated areas.

A notable aspect of the Area B biface debris is that it includes a large number of channel flakes. Indeed, even after extensive attempts at re-fitting fragments and excluding those items which passed through 1/4" mesh and those used for simple tools, there are more channel flakes from this one site area than have been reported from most other sites as a whole. This total clearly indicates that point manufacture was a major concern. None of these channel flakes can be refit onto finished fluted points from the area but one does fit on a fluted preform base (Figure 5.11g) broken in manufacture and two of these flakes fit onto finished points recovered from Area D (see Chapter 10). The lack of finished point/channel flake matches suggests the points were made elsewhere and brought to Parkhill. However, this inference should be treated with caution since many of the finished points from Area B are quite fragmentary and all would have seen some retouch and resharpening prior to discard but after fluting. These factors might frustrate actual refitting attempts.

In any event, it is interesting to note that the number of channel flakes to finished points in the excavated area is about 2.5 to 1 if used channel flakes are included or 2.36 to 1 if these used items are excluded. These totals are close to the average number of flutes per finished point in the whole Parkhill assemblage (2.04 to 1). It might suggest that comparable numbers of points were produced as were broken and then, discarded at this locus (N=55). However, this inference also should be treated with caution since there is a great tendency for channel flakes to

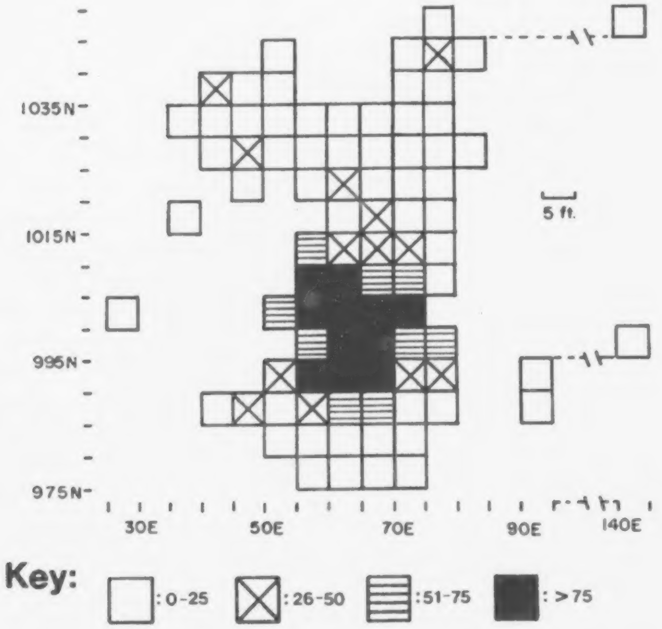


Figure 8.2: Density map of Paleo-Indian waste flakes, area B.

collapse in flute removal (Crabtree 1966:8). At Parkhill we have the added breakage due to site plowing. Moreover, it seems highly unlikely that an individual's transported tool kit would not include some finished points suitable for rehafting without any need for fluting. Therefore, these are only rough maximum estimates of the points manufactured.

As discussed in detail elsewhere (Ellis and Payne 1995), it is also possible to provide minimal estimates of at least, the number of bifaces fluted at the site. Assuming two flutes per point and taking into account the different raw materials represented, channel flake basal or platform ends suggest at least 18 points were fluted (17 if channel flakes used as tools are excluded). Interestingly, this estimate is close to one which can be obtained by simply taking the length of the channel flake segments recovered. Data from sites where more complete unused examples of Barnes points have been recovered, such as a cache of unresharpened fluted bifaces at the Thedford II site (Deller and Ellis 1992b), suggest an average flute length of 53.3 mm per face. On this basis, and excluding specimens from multiple fluted points, the combined length of the recovered channel flake segments recovered from Area B is enough to flute 18 items for 53.3 mm on each face (Ellis and Payne 1995).

Despite this congruence between two independent estimates, these estimates are undoubtedly low because many segments would pass through 1/4" used at most depths in excavation. This problem would especially effect basal ends as there appears to be a tendency for the channel flakes to collapse in removal close to the platforms. Moreover, some longer basal ends may have been removed to serve as blanks for small points. As well, it seems possible that small channel flake segments may be difficult to identify and have been included in with the flake fragments from the site. Perhaps these factors account for the fact that there are no basal ends among the Onondaga channel flakes recovered. Given these considerations it seems likely that the number of items fluted at the area was more than the minimal number of 17 to 18 suggested by the

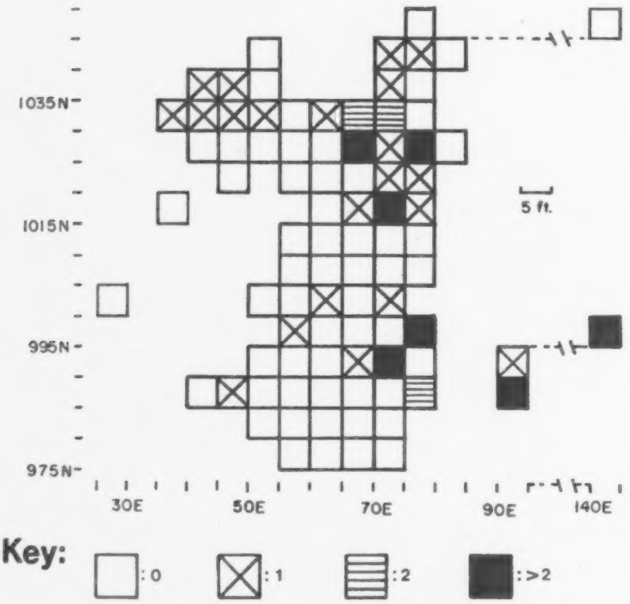


Figure 8.3: Density map of Kettle Point chert, subgreywacke and quartzite waste flakes, area B.

debris but less than the 55 suggested by the discarded point bases.

Even using this minimal estimate of 17-18 points fluted, it is quite clear that there was a relatively low rate of breakage in manufacture which resulted in the unsuccessful completion of a point to a useable form. As noted above, excluding the minor preform tip fragments whose removal from the preform would not impair finishing of the points, there is only a preform base and a relatively complete preform which probably represent items broken and rejected in manufacture. This low incidence suggests failure rates in manufacture from the fluting stage onward were probably less than ca. 12% at Area B (Ellis and Payne 1995).

Assemblage Summary, Area B

From the foregoing, it should be clear that the artifact assemblage from Area B is almost totally composed of points and point-making debris. Channel flake points and simple retouched flakes are the only other well-represented tool forms and even these occur in low frequencies (Table 8.1) and are also largely derivative of point production (e.g. many are produced on the fluting flakes). As noted earlier, only roughly 33% of the area was excavated. However, almost all surface finds from outside the excavated area (5 of 6) are preforms or fluted points and the debris from all peripheral test squares lacks uniface debris and includes some channel flakes or preforms. Hence, all indications are that the unexcavated areas are similarly biased towards point production and discard.

The extent of point manufacture and rehafting at Area B is emphasized if we compare it to other sites in southern Ontario and adjacent areas. As will be detailed in a later section, the percentage of fluted bifaces actually exceeds that reported from any other eastern Great Lakes site. In the area, the only sites or site areas which comes close to approaching Area B in fluted biface frequency are the Barnes site, Michigan where 44.4% of the recovered tools and preforms are of this nature and several other areas at Parkhill itself. Moreover, even at the Barnes site, the vast majority of the fluted bifaces (over 80%) are almost exclusively

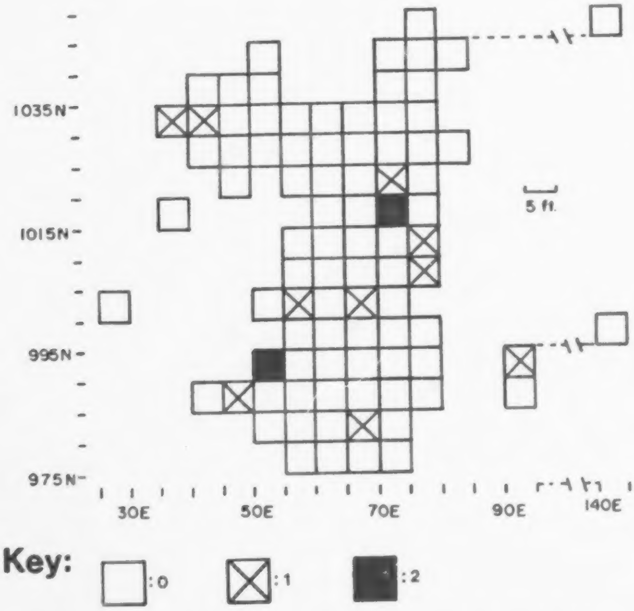


Figure 8.4: Density map of non-Paleo-Indian artifacts, area B.

preforms with few finished points being recovered. Therefore, Area B is not only notable for its emphasis on fluted biface manufacture but also represents the most extensive area of point re-hafting in the eastern Great Lakes, if not the Northeast as a whole.

The percentage of fluted bifaces at Area B led Roosa (1977b:96) to refer to it as an "armament area" after Judge's (1973:203) work with Folsom assemblages in the west. Judge (1973: Table 9) found that his Folsom site assemblages resolved into three groups based on inter-assemblage variability in tool inventories. Those sites dominated by, among other things, fluted points and preforms were the armament sites. However, it is quite clear that Area B is an armament area *extraordinaire* as on average, the Folsom armament sites include only ca. 45% fluted bifaces (calculated excluding the channel flakes which Judge [1973] included in his totals). Moreover, it should be emphasized that Judge's (1973) armament areas are dominated by preforms, not finished points as is the case at Area B. In sum, Judge (1973) regards such areas as "gearing-up" localities where points were prepared in anticipation of future use. Some of this certainly occurred at Area B but the dominance of points broken in use suggest post-hunt activities were also important.

In summary, Area B must be regarded as a highly specialized activity area or, in Wilmsen's (1970) terms, a limited activity location. Acquiescing to the tyranny of the ethnographic record, the emphasis on projectile use and manufacture might suggest it is a male-oriented activity locus.

Features

Feature numbers were assigned to any subsoil anomaly at the site, regardless of whether these were rodent/root disturbances, geological manifestations or cultural features. A large number of features were recognized at Area B. However, the nature of feature contents as determined in the lab, and careful examination of the written and photographic records of size, shape, colour, etc, suggests only three are credible Paleo-Indian features. The location of these three features within the area is shown on Figure 8.1 and they are described, in

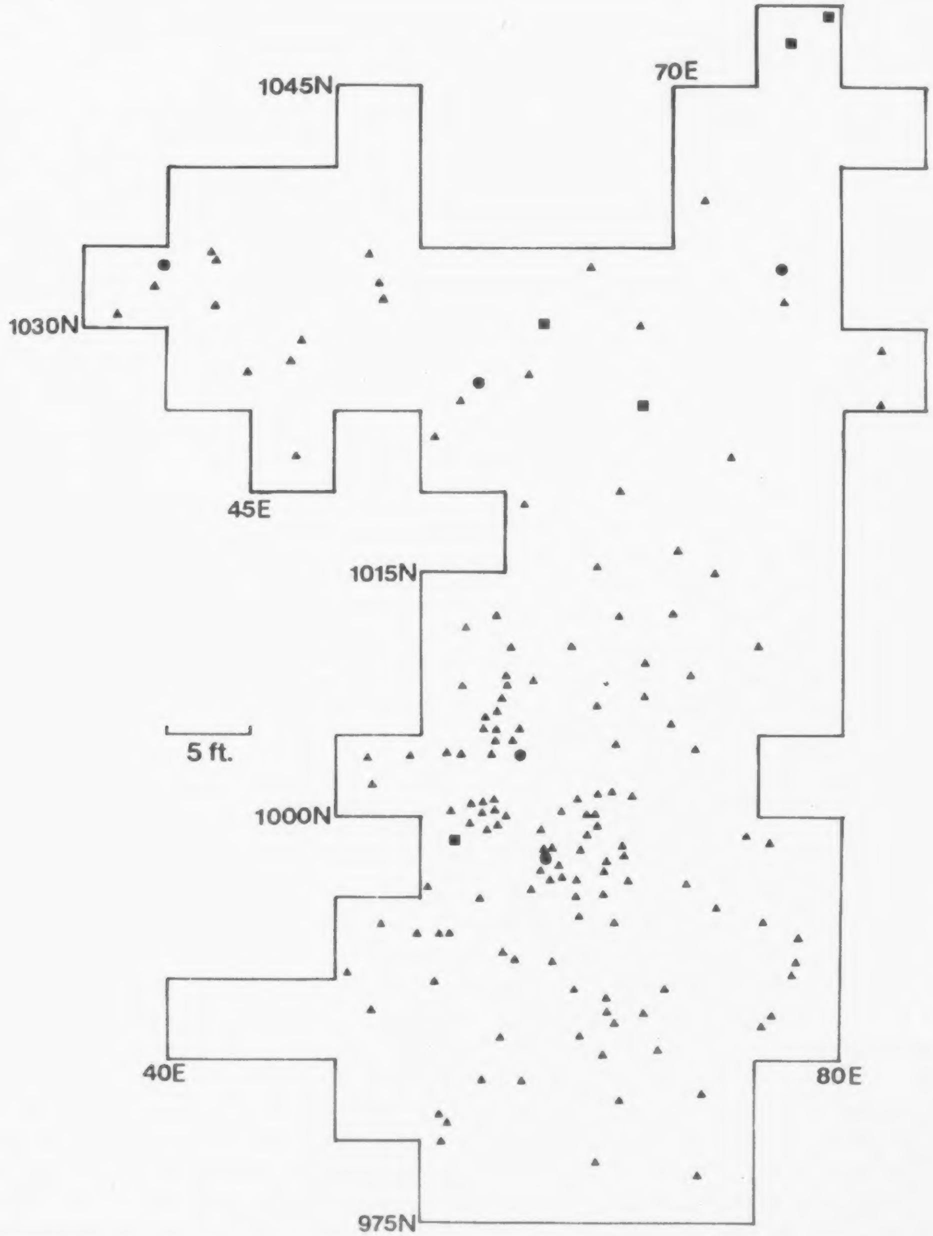

1045N
70E
1030N
45E
1015N
5 ft.
1000N
40E
80E
975N

Figure 8.5: Distribution of channel flakes, area B. Triangles: Collingwood chert; Circles: Onondaga chert; Squares: Bayport chert.

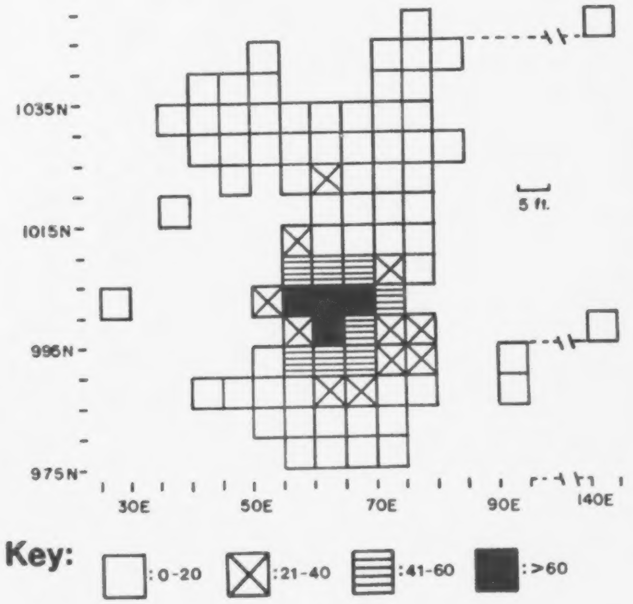


Figure 8.6: Density map of biface debris excluding channel flakes, area B.

turn, below. Unlike some of the features recognized at the Thedford II site (Deller and Ellis 1992b), all of these Parkhill features had visible outlines. In short, there were no subsoil concentrations of artifactual material which were not in subsoil anomalies.

Feature 6A

This feature was situated primarily in 990N/55E (Figure 8.1). It was a small (3.5 by 1.75 ft.), bilobate stain which extended 0.63 ft. into the subsoil and was "kidney-shaped" in outline. The feature had well-defined margins except for a slight disturbance by a tree throw (Feature 6/8) at its southeast corner. The feature matrix was a very dark brown (10 YR 2/2 in the Munsell system) when moist and contained a few pebbles and some very small and unidentifiable, charcoal flecks.

The feature location coincides with a dense plowzone cluster of flaking debris (Figure 8.2). The feature itself contained 15 flakes but not all feature samples have been processed by flotation. All the recovered flakes were on Collingwood chert and included three biface finishing flakes, one flake fragment and one channel flake. The only tool included was a fluted point tip on Collingwood chert. There is a decided lack of tools/preforms in the plowzone above the feature but five basal point fragments occurred within four feet of its southern margin (Figure 8.1).

Small features of a roughly bilobate form appear to be widespread on northeastern Paleo-Indian sites. For example, several are reported from the Debert site (e.g. Features 7D, 9A, 9B, etc.; MacDonald 1968), the Michaud site (Spiess and Wilson 1987:79-80) and the Sandy Ridge site (Jackson 1994: Figure 14, 1998: Figure 12). Moreover, at least one other occurs at Parkhill, Area B (Feature 9A; see below).

Feature 9

Excepting Feature 1 at the Crowfield site (Deller and Ellis 1984), Feature 9 is the best candidate for a Paleo-Indian feature yet encountered during excavations on these sites in southwestern Ontario. It was located at the

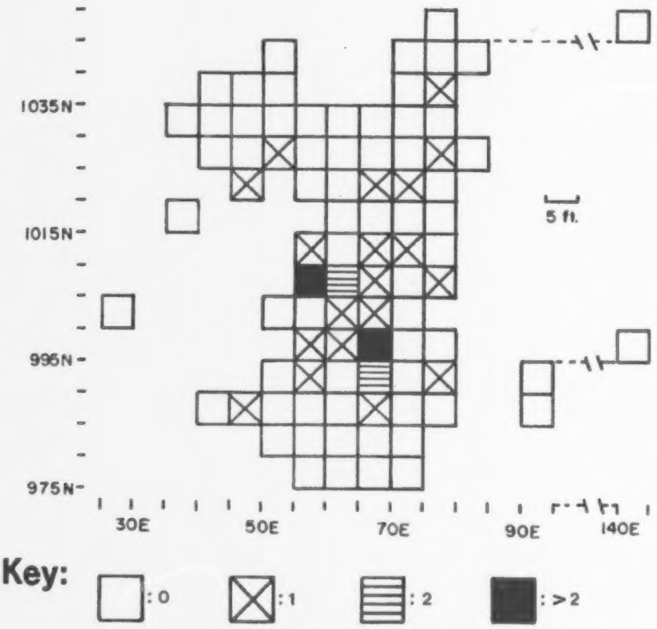


Figure 8.7: Density map of uniface retouch flakes, area B.

intersection of the 1005N and 65E grid lines and was at the north end of the densest concentration of tools and debris at the site (Figures 8.1 and 8.2).

The feature measured 6.0 by 4.5 ft. and extended on average down to 0.99 ft. into the subsoil. In plan, it was only roughly bilobate while in profile in formed a convex basin. When moist, the feature fill was primarily a very dark greyish brown (10 YR 3/2). Not unexpectedly, given its shallow depth and age, the feature had been disturbed. A burned root system (Feature 11) bordered and undercut the feature on its east side. Moreover, a clear, linear disturbance of this nature with a circular profile is visible in the detailed slide records cutting through the southern margin. This disturbance was bordered on the southwest by fire-reddened soil. Since such reddening does not occur at undisturbed margins, it clearly is a product of the root burn. Although a very few, exceptionally small charcoal flecks were distributed throughout the feature fill, most of the charcoal was concentrated along the southern margin in the root disturbance. Therefore, it is not surprising that the only identifiable charcoal and other vegetal material is of recent origin and includes beech and sugar maple as well as charred and uncharred blackberry/raspberry seeds.

A relatively large amount of cultural material was recovered from this feature. This material included 148 waste flakes. Moreover, much of the feature matrix was shipped during dating attempts in the 1970's to radiocarbon laboratories and was not floated for flake recovery. As a result, it is probable that three or more times as many waste flakes would have been recovered had all of the feature sample been floated. In any case, except for four Bayport and three Onondaga chert waste flakes, the recovered material is exclusively on Collingwood chert. There are 65 biface finishing flakes, one channel flake and 82 flake fragments. Four tools were also in the fill. These consisted of two finished point ears, one point base and an unidentifiable fluted biface fragment, all of which are on Collingwood chert. In addition, a point base, a point tip and a preform tip were recovered from the plowzone directly above or at the immediate perimeter of the feature.

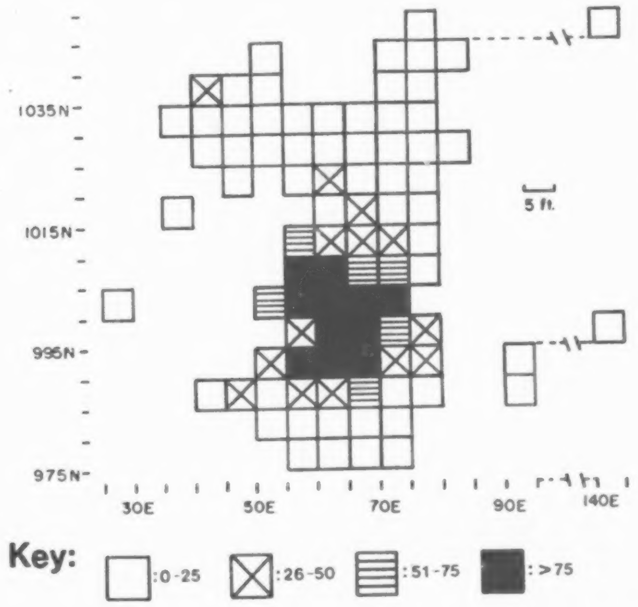


Figure 8.8: Density map of Collingwood chert waste flakes, area B.

Feature 9A

This feature was located just southwest of Feature 9 near the intersection of the 1000N and 60E grid lines (Figure 8.1). At the plowzone-subsoil interface, deep plow scarring left the impression it was part of Feature 9 but when taken down slightly into the subsoil, it resolved into a discrete feature. As with Feature 6A, the feature was small, bilobate and "kidney-shaped", and contained a very dark brown (10 YR 2/2) charcoal flecked sand. Because of their small size, none of the few charcoal pieces recovered could be identified as to species. Feature 9A measured 3.35 by 2.2 ft. and a 0.48 ft. depth was preserved below the plowzone.

The feature contained six biface finishing flakes and one flake fragment. Two of the former are on Bayport chert while the rest of the flakes are on Collingwood chert. The only other artifact inclusion was a Collingwood chert fluted point base. However, there is a dense cluster of tools and debris around the feature in the plowzone (Figures 8.1, 8.2). Included in the tools are another point base, a point mid-section, a fluted preform tip, a side scraper fragment and a retouched flake.

Spatial Distributions

Figures 8.1 to 8.12 show the distribution and density of various kinds of artifactual material recovered from Area B. Since almost all squares were excavated in the same manner at Area B (e.g. 1/8" in upper 0.2 ft of plowzone and 1/4" mesh at other depths), the densities are based on all material recovered including that which would be recovered only in 1/8" mesh. The density maps include simple plottings of frequency per five foot square for certain categories such as waste flakes, as well as contour density maps for piece-plotted data including tools/preforms (Figure 8.11) and channel flakes (Figure 8.12). These contour density maps were produced using the moving template method (Whallon 1984:228). It involved counting all items within a consistent, specified distance of particular, evenly spaced points on the grid system. These counts are then plotted and contours are drawn linking points with the same densities. A potential drawback of this technique is that it tends to artificially introduce low artifact densities along the

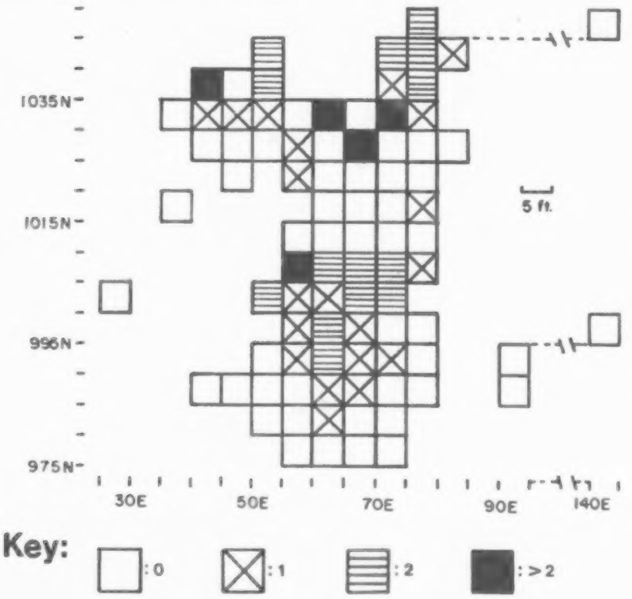


Figure 8.9: Density map of Bayport chert waste flakes, area B.

margins of excavated areas. This dampening effect is a result of the fact that much of the area around marginal points is unexcavated and thus, provides no or lowered counts. Densities were calculated at each 2.5 ft. interval on the main north and south grid lines. The counts included every item within a 2.5 ft. radius of those points. In making these counts, separate pieces of the same artifact were counted as different items. This practice was followed because the site has been ploughed and we do not know which location, if not both, best represent the original discard location. Moreover, and also because of ploughing which must have moved some objects (see below), in order to minimize noise we only plotted contours of two items or above. It should be noted that there were a very few tools and preforms which had provenience data only to a 5 ft. square. These are indicated on Figure 8.1 and for convenience, are placed on that map in the exact centre of the square. In order to avoid biases in placement during density contour data collection, these specimens were plotted by using random northing and easting co-ordinates provided by a table of random numbers. It should be noted that all density diagrams provided for Area B include those items recovered in 1/8" mesh. As a result, there is a bias towards lower totals in those two squares where this mesh was not employed. Yet, this procedure does not appear to have introduced any biases with regard to those two squares.

Examination of the density maps, regardless of how they were plotted and what is plotted, clearly indicate a dense concentration of material between the 990N and 1010N grid lines associated with the best candidates for Paleo-Indian features. Areas beyond that concentration only yielded a sprinkling of materials. Based on the density contours of two tools/preforms or above (Figure 8.11), one might argue these peripheral areas, and particularly those at the north end of the excavated area, are artifact clusters of cultural significance. In fact, such an interpretation could be supported by the fact density contours of channel flakes (Figure 8.12) largely match those of the tools as can be clearly seen by superimposing these two density contour maps (Figure 8.13). Indeed, Roosa (1977b:109-115) suggested these small concentrations of points, the odd preform, and flaking debris perhaps represented "two-man work areas."

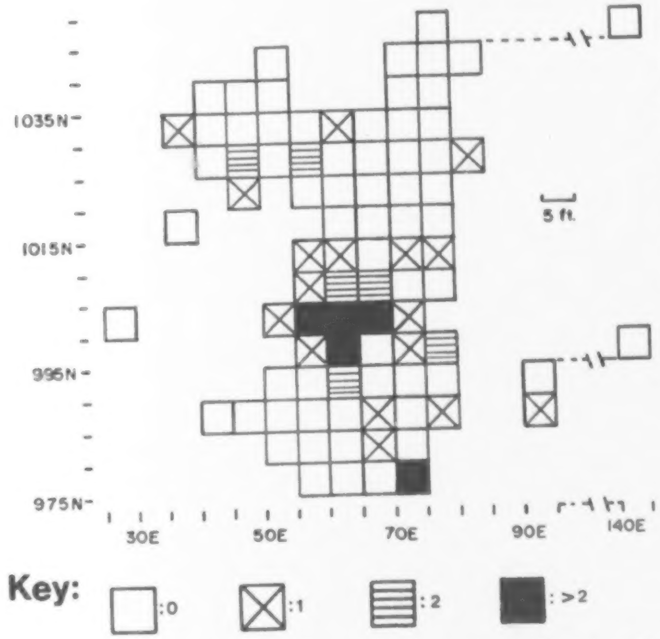
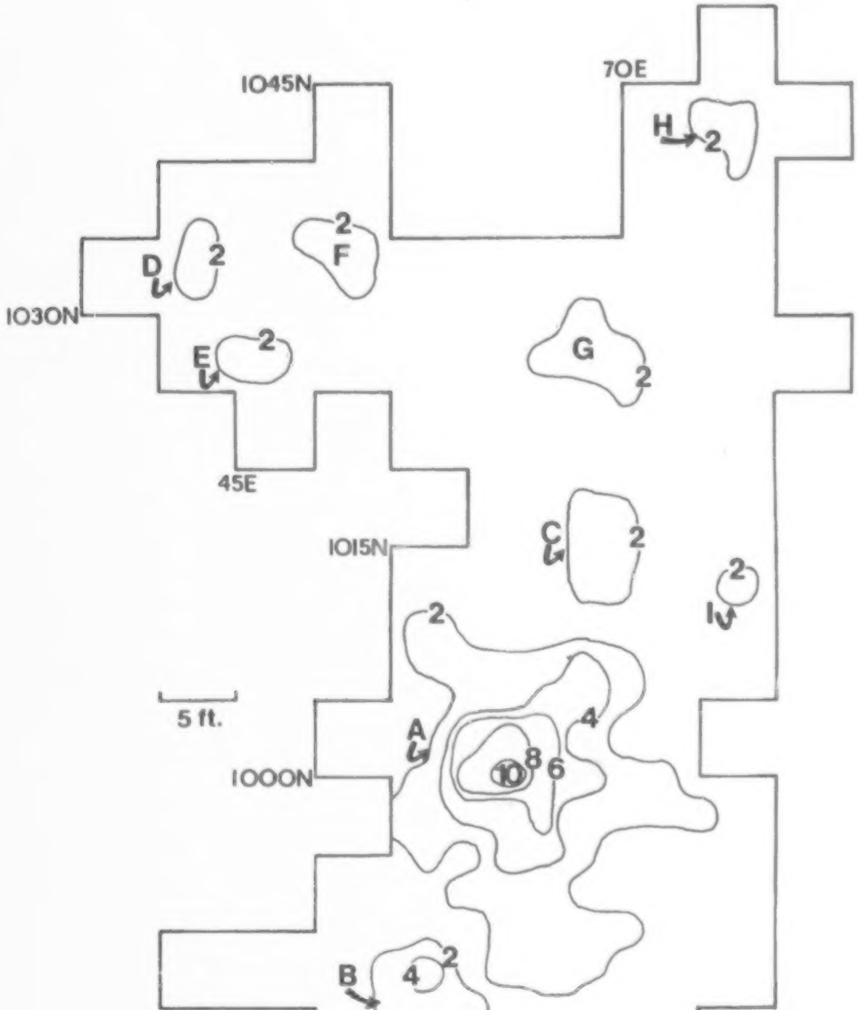


Figure 8.10: Density map of Onondaga chert waste flakes, area B.

The Parkhill site has been ploughed for almost 100 years. Based on our work at several Paleo-Indian sites, and particularly the examination of artifact refit patterns, we have argued ploughing does not obscure more general or coarse-grained spatial patterning (e.g. Deller and Ellis 1984, 1992b, 1996) although it can move around individual artifacts or pieces of the same. Moreover, we have been able to show that such clustering at other sites coincides with differences in tool types, raw materials, and refit patterns (e.g. Deller and Ellis 1992b, 1996) -- in other words, one gets distributional patterns which are difficult to argue are a product of ploughing unless one wants to argue ploughing would also separate out different artifact types and raw materials. However, we accept that ploughing definitely can create clusters of material (e.g. Odell and Cowan 1987) and given the very low densities of material in these peripheral areas and the length of time Parkhill has been ploughed, we believe it is very possible these individual "concentrations" in the peripheral areas are a fortuitous product of post-depositional events, including not only ploughing, but perhaps tree-throws which could concentrate material. Moreover, in support of their fortuitous nature, we note that some of these clusters can be linked to one another as well as the denser concentration to the south by refits of both tools/preforms (Figure 8.14) and channel flake pieces (Figure 8.15). In fact, except for the odd refitted piece which is usually close together, most items at Grid B and especially the channel flakes, have been moved predominantly north to south which matches generally the direction of cultivation at the time the site was investigated and we presume, for much of its history. A predominant refit pattern following the direction of ploughing is noted at several sites we have excavated (e.g. Deller and Ellis 1984, 1992b) as well as in experimental studies (Odell and Cowan 1987:469-473). We do not mean to imply that all the artifacts in low density peripheral areas were produced by ploughing of a single larger, more central and denser concentration. The expansive nature of Area B much beyond that excavated and the fact, for example, that Bayport chert debris is just as common in frequency in the northern areas of low density as to the south (Figure 8.9), suggests the lower density areas were locations of actual cultural activity even if only the


1045N
70E
H
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2
G
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2
5 ft.
A
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6
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B
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2
40E
80E
975N

Figure 8.11: Contour density map of tools/preforms, area B.

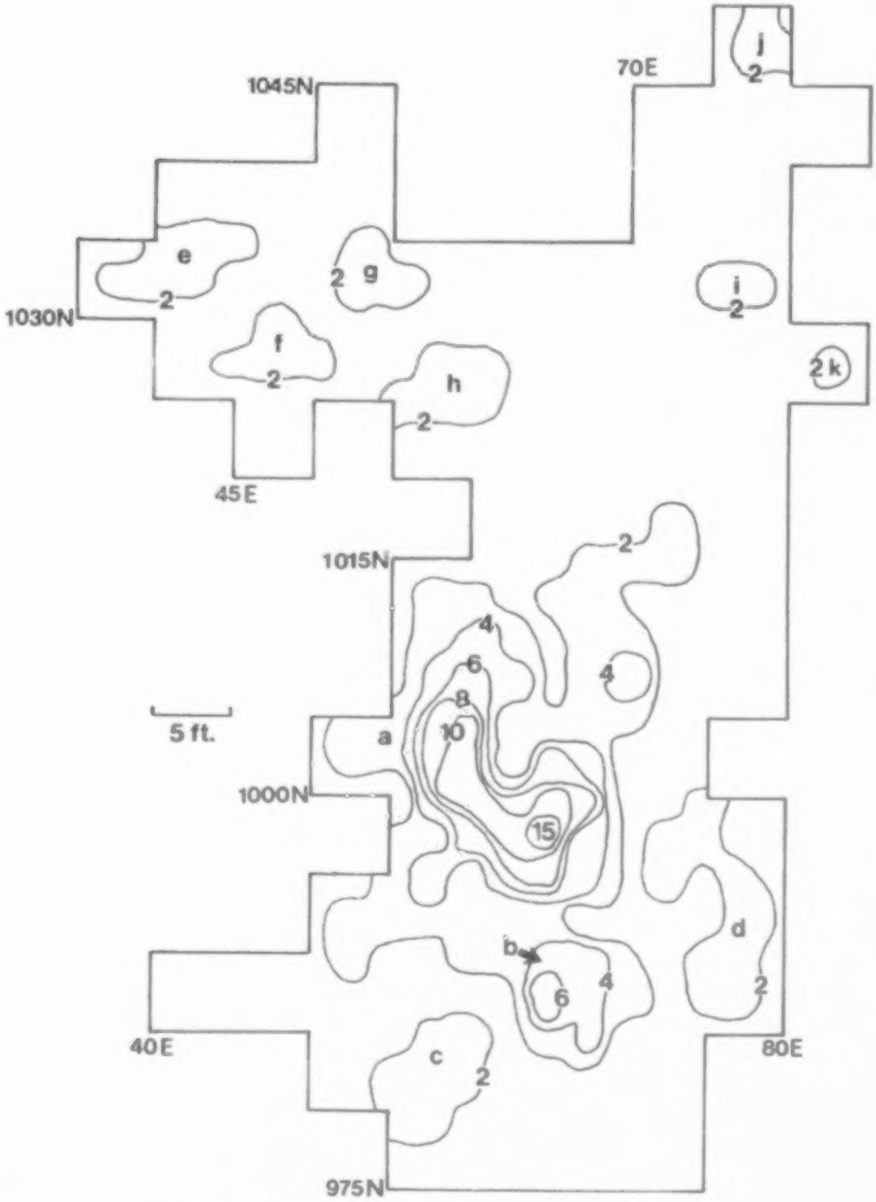
70E
j
2
1045N
e
2
g
2
i
2
1030N
f
2
h
2
2k
45E
1015N
2
4
4
6
8
5 ft.
a
10
1000N
15
b
d
4
6
2
40E
c
2
80E
975N

Figure 8.12: Contour density map of channel flakes, area B.

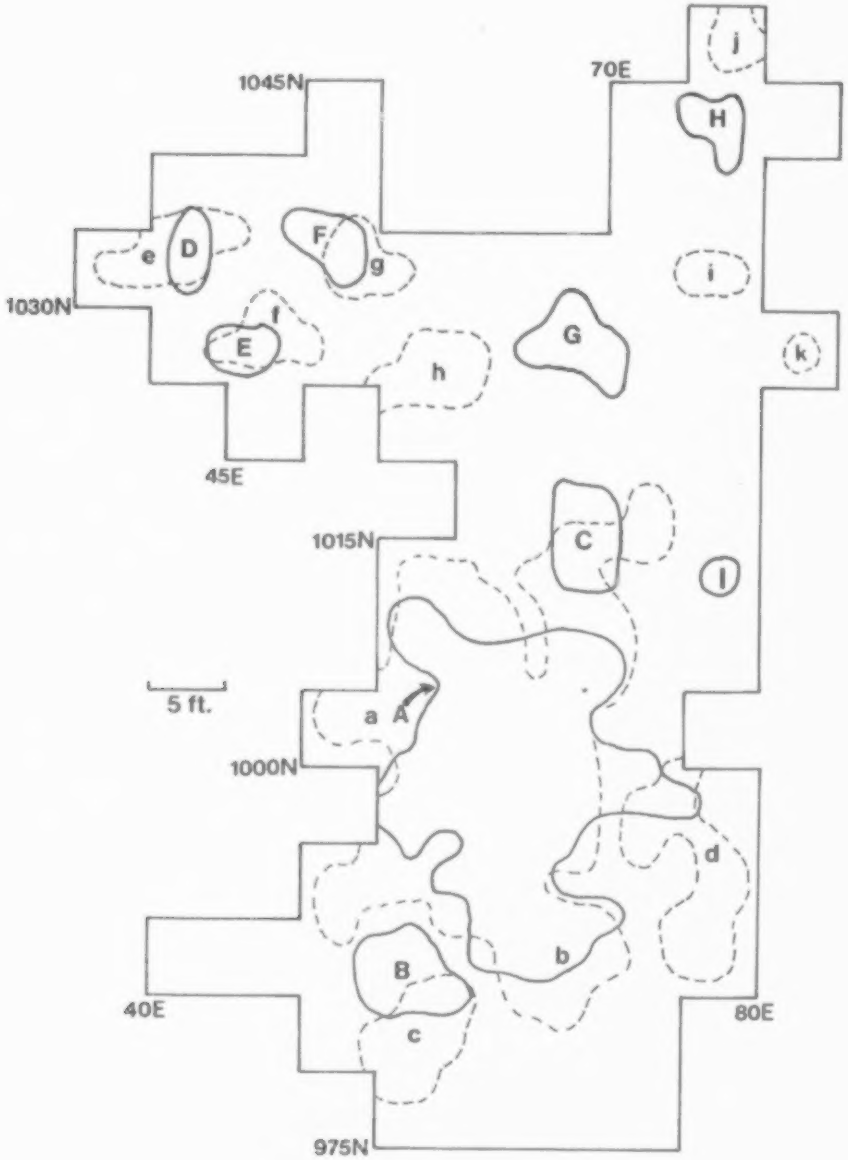
1045N
70E
1030N
45E
1015N
1000N
40E
80E
975N
5 ft.
A
B
C
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Figure 8.13: Superimposed contour density map of tools/preforms (solid lines) and channel flakes (dashed lines), area B. Contours are two-item density plots.

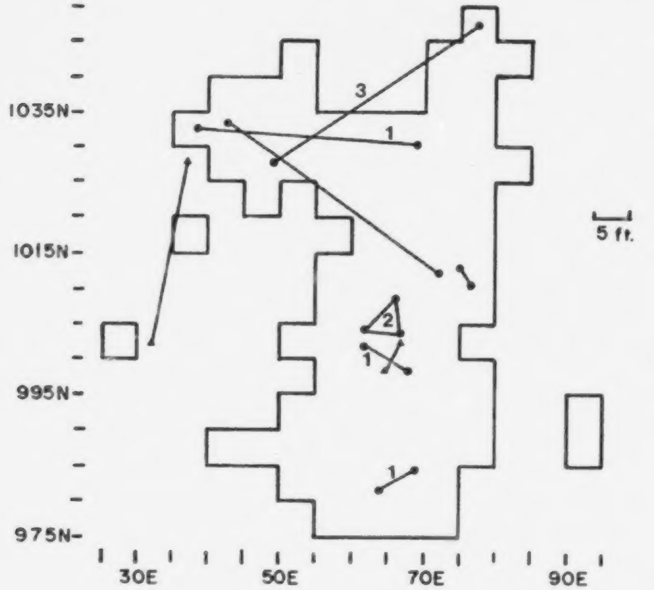


Figure 8.14: Refits among tools/preforms, area B. Triangles: items broken by post-depositional disturbances; Circles: items initially separated by Paleo-Indian activities. 1- Channel flakes with one subsequently used segment; 2- Uniface retouch flakes with two subsequently used; 3- Channel flake and preform base cross-mend.

discard of artifacts. We only question whether one can specifically treat the low density concentrations as having a behavioural reality.

Overall, other than the major concentration of debris in feature vicinities, a pattern noted elsewhere (e.g. Gramly 1982; MacDonald 1968), the only notable spatial aspect of probable behavioural significance is the fact the four channel flake points from the area were recovered in close proximity in a roughly seven by ten foot area between Feature 9/9A and Feature 6A (see Figure 8.1). If anything, these items were probably in closer proximity prior to ploughing of the site. Some have seen such items as toys used by children (e.g. Roosa 1977b:107). The close clustering of these very rare kinds of artifacts suggests purposeful placement at Parkhill Area B. Also, one would expect a more dispersed random pattern of discard if they were used by children. Such evidence has led to the suggestion these points are not toys but in fact, were objects used in sacred ritual (Ellis 1994a:262-263).

Other Considerations

Whether Area B represents one or more occupations is unknown. Roosa (1977b) had suggested several occupations but Ellis (1979), citing the highly specialized nature of the area even in comparison to several other areas at Parkhill as well as differences in the emphases on the use of certain raw materials between this and near-by areas such as Area C (see next chapter), has suggested one or a minimal number of occupations. In any case, the recovered debris suggests pre-hunting as well as post-hunting activities; the former represented by point-making debris and the latter by numerous finished point fragments. The sequencing of point use, rehafting and manufacture is not totally clear. However, none of the channel flakes fit onto points recovered from the area. Under this condition, one can argue point use and breakage would have largely preceded the other activities. When broken in

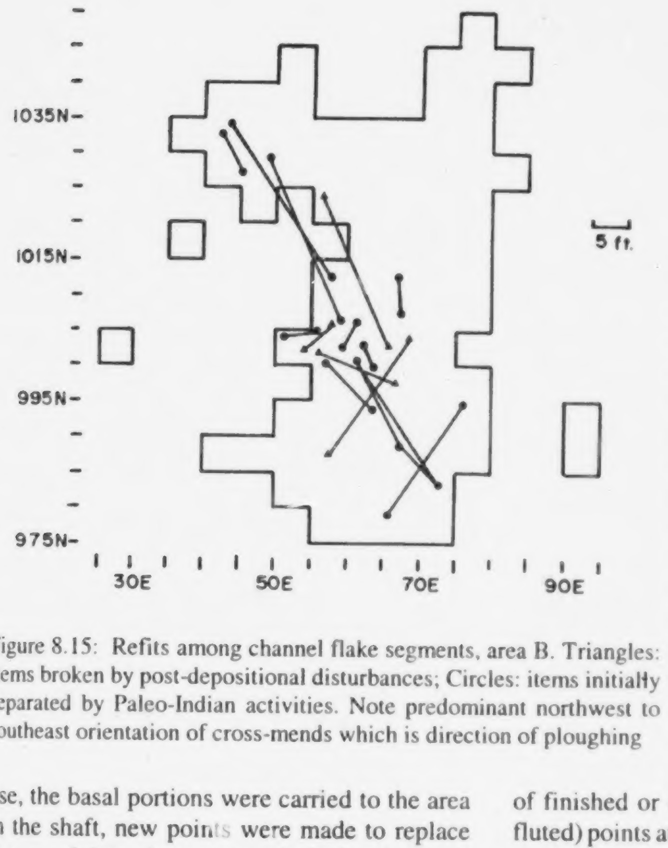


Figure 8.15: Refits among channel flake segments, area B. Triangles: items broken by post-depositional disturbances; Circles: items initially separated by Paleo-Indian activities. Note predominant northwest to southeast orientation of cross-mends which is direction of ploughing

use, the basal portions were carried to the area in the shaft, new points were made to replace them and then, these were rehafted and carried off to be used elsewhere. This scenario would imply that the use of the tools actually preceded the occupation at Area B (Deller 1988:160).

Nonetheless, one should not rely too heavily on the lack of channel flake point cross-mends and particularly since it involves attempting to refit the channel flakes to very fragmentary points. Also, there are excellent indications that points made at Area B were used in the site area. In particular, two points made at Area B as evidenced by their recovered channel flakes, were subsequently used, broken and then discarded at Area D. Granted this consideration, the lack of channel flake - point matchups at Area B may be largely due to the highly fragmentary nature of the point assemblage. Further, a simple model which assumes points were broken in use and then all were replaced solely by new ones made on the spot is questionable. This scenario assumes that already finished but unhafted points were not part of an individual's transported tool kit. Many points broken in use during the occupation could have been replaced and rehafted by points made elsewhere without the channel flakes being produced on the site. That a transported tool kit would include a number of finished but unhafted points is strongly suggested by the presence of caches of a number of finished or almost finished (that is, already fluted) points at sites such as Thedford II (Deller and Ellis 1992b) or for that matter, the probable Crowfield site grave goods (Deller and Ellis 1984). In addition, as will be discussed later (see Chapter 12), assemblage contrasts between sites such as Parkhill and chert outcrop area sites like Fisher (Storck 1997) suggest many points may have been made near such outcrops which were to be used in times much removed spatially from chert source locations. The transportation of unhafted but finished points would mean that the chances of a point being made and then discarded at the same locus would be lowered. In general, this would lower the probability of point - channel flake matchups.

Granted all of the above, once could argue that the use of the area may not have been a simple "point use prior to occupation - point discard - point manufacture - point rehafting -- leave Area B" scenario. The evidence of some points made at Area B being used in the site vicinity suggests that hunting was carried out during the time the area was used. Employment of the discarded points need not largely or wholly precede the occupation. Rather, it is still possible that the Area B use may have included several cycles of point use, rehafting and manufacture, albeit within a short period of time -- perhaps even one season.

Finally, and as stressed in the above, Area B seems to be an extremely specialized work area with little evidence of any activities other than the fluting and hafting of new bifaces to replace worn out and broken ones. Given this highly specialized nature, it is tempting to make two arguments.

First, one could argue that the few other distinctive tool forms recovered from the area such as the large parallel-sided end scraper, the beak and the hafted perforator were also employed somehow in the same activities. For example, the large robust end scraper form could have been used in the shaping or smoothing of items such as shafts or foreshafts and the beak and perforator could have been used in the incising of slots or sockets in hafts or some related activity. Similarly, and given the evidence for extensive fluting of points in the area, the presence of small channel flake points could be seen as evidence of sacred ritual activity and there are those who have in fact argued that fluting *per se* was carried out in the context of "supernatural" activities (e.g. Bradley 1993:255-256).

Second, one could also argue, given the dominance of fluted bifaces and the ethnographic evidence for use of projectile weapons, that this area is a specialized *male* work area and in turn, that the other tools recovered were also used by males. Since ethnographic evidence would lead us to expect that a sexual division of labour would be a major conditioner of spatial patterning in the archaeological record of band societies in general (e.g. Sassaman 1992:220; Spencer and Flannery 1986; Stevenson 1991:286-292), we do not believe this suggestion is a far-fetched one. However, we should express some cautionary tales with regard to this inferences as well to the previous one about tool form associations in tasks.

First, we are biased towards evidence of activities leaving lithic remains. It is entirely possible the unifacial forms from Area B are not associated with point hafting activities but some other task which was carried out but cannot be distinguished. Also, it is possible that the heavily resharpened perforator and even the end scraper bit (the haft portion could remain in immediately adjacent unexcavated areas) are present not because they were used at that location. Rather, they may be present simply because, like the points, they were discarded during the rehafting of a new specimen for future use at some other location. Similarly, the location of these items in what could be considered a male activity area does not rule out the possibility these forms were used by females as well. Moreover, it is possible that the hafted unifaces were only hafted by men but not actually employed by them in tasks.

Despite these reservations, it is worth searching out patterns of association of tool forms such as the hafted perforators and the large parallel-sided end scrapers with evidence of point hafting at other sites. In this regard, the only possible example of the latter tool form (end and convex side scrapers) from the excavated area at the nearby Thedford II site (Deller and Ellis 1992b) was in an area also containing point bases suggestive of rehafting. Furthermore, both this tool form and a beak were recovered from Area C where rehafting was also emphasized (see next chapter). Moreover, the frequently snapped bits of the large end scrapers does suggest heavy duty use, perhaps in the making of shafts.

CHAPTER 9

AREA C

Introduction

Area C is located 250 feet south of B (Figure 1.3). According to the surface scatter of debitage and implements, it appears to encompass an oval area of approximately 2500 to 3000 square feet (ca. 250 m^2). Excavations were carried out in this area for parts of the 1974 and 1975 field seasons. In all, 48 squares or 1200 sq. ft. was excavated (Table 1.1) and all excavated units yielded Paleo-Indian materials. Most of the excavated units were placed together in one major block near the north end of the known surface distribution (1025 sq. ft. or ca. 100 m^2; Figure 9.1). One-eighth inch mesh was employed to screen the top two-tenths of a foot in the plowzone in most squares. However, near the end of the 1975 field season, and in order to expand the area excavated as much as possible in the short time available, the use of the time-consuming 1/8" mesh was abandoned. In order to control for this bias, all material recovered in 1/8" mesh was rescreened through 1/4" mesh in the lab and the totals recalculated for intra-area, inter-area and inter-site comparisons. Furthermore, all density maps for materials given in this chapter exclude the material which would only be recovered in 1/8" mesh in order to standardize separate excavation units for comparison.

Artifact Assemblage

Tools/Preforms

Some 57 definite Paleo-Indian tools and preforms were recovered from Area C of which 45 came from within the area excavated (Table 9.1). This total excludes a single item on Kettle Point chert which may be Paleo-Indian associated and will be discussed more below. Although the Area C items are primarily on Collingwood chert, a contrast with Area B is a higher percentage of Onondaga and Bayport chert specimens, primarily among the unifacial tools. Almost half of the recovered artifacts (45.6%) are fluted bifaces. As at Area B, most of these are finished points (76.9%) and are predominantly (85%) basal sections indicative of rehafting activities.

One finished point fore-section was recycled into a fluted point "blade" while a single item which can not be assigned to the point or preform category was made into the tear-drop shaped biface (Figure 5.6d). It is possible that this latter item is simply a much more resharpened version of the former. Only three preforms were recovered. One of note is a small tip-section removed by an outre-passé termination. As at Area B, the lack of the large remainder of this point suggest it was finished into a point and removed from the area. Another preform (Figure 5.11b) is in two pieces and apparently broke in finishing. A channel flake removed from one face of this item was also recovered.

Excepting a mid-section and a tip from large alternately bevelled bifaces, the remainder of the assemblage is unifacial. Among these, micro-piercers or gravers are the only common form (four examples). These include one tool produced through recycling at the proximal end of a trianguloid end scraper. One unifacial tool is the bit end of a large, parallel-sided end

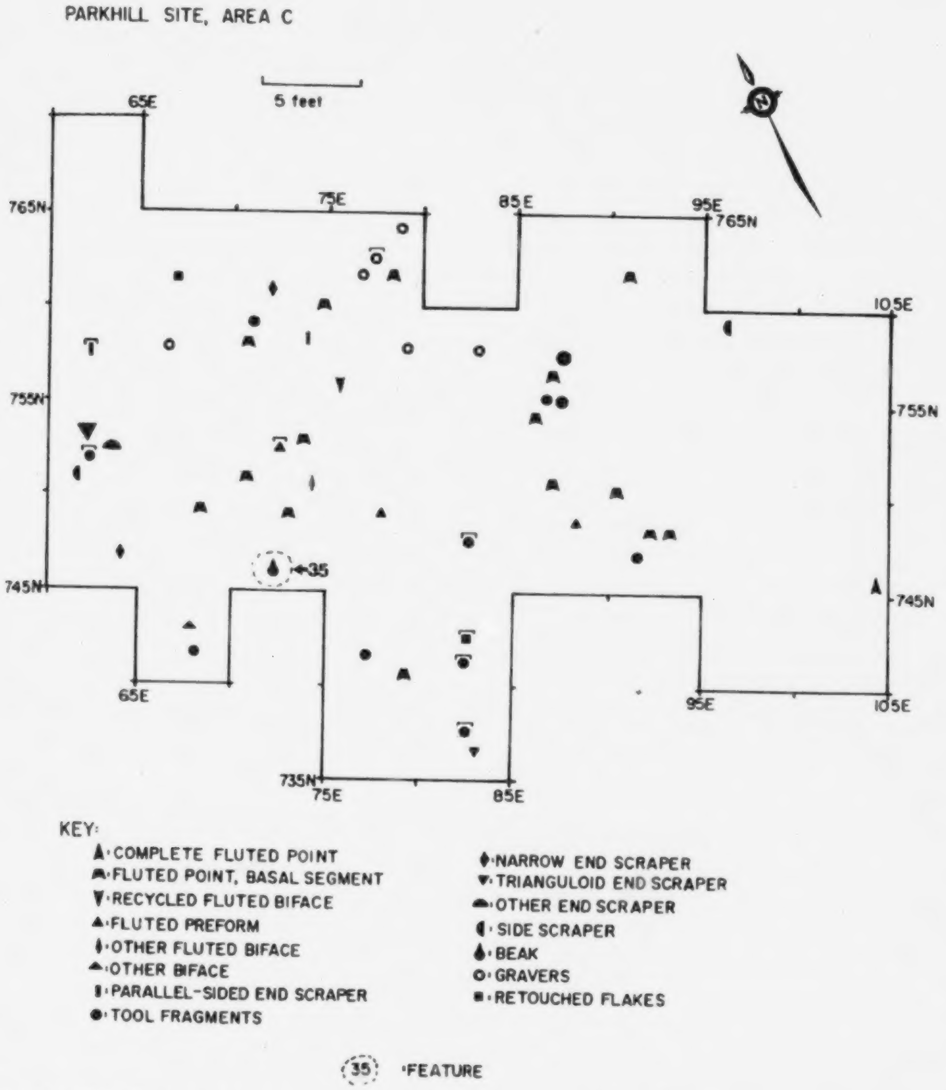

PARKHILL SITE, AREA C
5 feet
65E
75E
85E
95E
105E
765N
755N
745N
735N
35
KEY:
▲ · COMPLETE FLUTED POINT
▲ · FLUTED POINT, BASAL SEGMENT
▼ · RECYCLED FLUTED BIFACE
▲ · FLUTED PREFORM
♦ · OTHER FLUTED BIFACE
▲ · OTHER BIFACE
▮ · PARALLEL-SIDED END SCRAPER
● · TOOL FRAGMENTS
♦ · NARROW END SCRAPER
▼ · TRIANGULOID END SCRAPER
▲ · OTHER END SCRAPER
◖ · SIDE SCRAPER
♠ · BEAK
○ · GRAVERS
■ · RETOUCHED FLAKES
35 · FEATURE

Figure 9.1: Distribution of tools/preforms and features, area C. "Hatted" items represent approximate locations.

scraper. This tool is notable in that it is not made on a chert. Rather, it is on a banded meta-sediment of unknown origin. Two uniface retouch flakes recovered are on the same material and were probably derived from the resharpening of this tool although they can not be physically refit. The two narrow end scrapers include the one item with two bits (Figure

Table 9.1: Tool/Preform Totals, Area C.*

TYPE/CLASS	COLLINGWOOD	ONONDAGA	BAYPORT	UNKNOWN	TOTALS
Fluted Points	19 [95%]	-	1 [5%]	-	20
Fluted Preforms	2 [66.7%]	1 [33.3%]	-	-	3
Other fluted Bifaces	2 [66.7%]	1 [33.3%]	-	-	3
Unfluted preforms	-	-	-	-	-
Channel flake Points	-	-	-	-	-
Large alternately Bevelled bifaces	1 [50%]	1 [50%]	-	-	2
Small alternately Bevelled bifaces	-	-	-	-	-
Backed bifaces	-	-	-	-	-
Marginally retouched Bifaces	-	-	-	-	-
Biface fragments	1 [100%]	-	-	-	1
Trianguloid End scrapers	2 [66.7%]	-(1)	1(2) [33.3%]	-	3(5)
Large parallel-Sided end scrapers	-	-(1)	-	1 [100%]	1(2)
Laterally notched End scrapers	-	-	-	-	-
Fluted end scrapers	1 [100%]	-	-	-	1
Bi-bitted end scrapers	-	-	-	-	-

Table 9.1: Continued.

TYPE/CLASS	COLLINGWOOD	ONONDAGA	BAYPORT	UNKNOWN	TOTALS
Narrow end scrapers	1 [50%]	1 [50%]	-	-	2
Offset end scrapers	-	-	-	-	-
Other end scrapers	-	-	-	-	-
Simple beak	-	1 [100%]	-	-	1
Hafted perforators	-	-	-	-	-
Piercers or gravers	2 [50%]	-	2 [50%]	-	4
Denticulate	-	-	-	-	-
Notch/borer/ denticulate	-	-	-	-	-
Concave side scrapers with spurs	-	-	1 * [100%]	-	1
Other side scrapers	2 [66.7%]	-	1 [33.3%]	-	3
Retouched flakes	1 [50%]	1 [50%]	-	-	2
Other unifaces & fragments	8 [80%]	2 [20%]	-	-	10
Totals	42 [73.7%]	8 [14%]	6 [10.5%]	1 [1.8%]	57 (60)

* totals in rounded brackets includes items counted in their original and recycled form.

6.16a) and one made on the lateral edge of a recycled trianguloid end scraper which had a segment of the bit snapped off in use (Figure 6.10g). The snapped bit of the latter tool was also recovered suggesting the breakage and recycling occurred on site. Both the retouched flakes are based on channel flakes.

Table 9.2: Debris Totals Area C Including 1/8" & Flotation Items.*

DEBRIS TYPE	COLLINGWOOD	ONONDAGA	BAYPORT	UNKNOWN	TOTALS
Channel flakes	23 [56.1%]	6(7) [14.6%]	10 [24.4%]	2 [4.9%]	41(42)
Normal biface thinning flakes	7 [25.9%]	19 [70.4%]	1 [3.7%]	-	27
End biface thinning flakes	-	-	-	-	0
Biface reduction errors	4 [33.3%]	6 [50.0%]	2 [16.7%]	-	12
Biface finishing flakes	341 [58.8%]	143 [24.7%]	85 [14.7%]	11 [1.9%]	580
Normal uniface retouch flakes	59 [35.5%]	5 [3.0%]	91 [54.8%]	11 [6.6%]	166
Ventral uniface retouch flakes	1 [100%]	-	-	-	1
Fragments	297 [55.8%]	170 [32.0%]	54 [10.2%]	11 [2.1%]	532
Other	4 [40%]	3 [30%]	1 [10%]	2 [20%]	10
Totals	736 [53.8%]	352(353) [25.7%]	244 [17.8%]	37 [2.7%]	1369(1370)

*totals in round brackets include subsequently used items.

Flaking Debris

After re-fitting attempts, definite Paleo-Indian flaking debris from the area totals 1369 items (Table 9.2). This total excludes two used channel flakes (one of which fits onto an unused segment) and excludes some 77 pieces of Kettle Point chert and sub-greywacke debris. These 77 flakes may be associated with the Paleo-Indian occupation at Area C and are described in a separate section below. After resieving the 1/8" material in 1/4", the total number of definite pieces of Paleo-Indian flaking debris recovered from Area C is reduced to 1050 (Table 9.3).

While Bayport and unidentifiable materials are represented in comparable frequencies among both the debris and tools, there are differences amongst the remaining materials. In particular, Collingwood chert debris is poorly represented among the debris

Table 9.3: Debris Totals Area C Excluding 1/8" & Flotation Items.

DEBRIS TYPE	COLLINGWOOD	ONONDAGA	BAYPORT	UNKNOWN	TOTALS
Channel flakes	21 [53.8%]	6(7) [15.4%]	10 [25.6%]	2 [5.1%]	39(40)
Normal biface thinning flakes	7 [25.9%]	19 [70.4%]	1 [3.7%]	-	27
End biface thinning flakes	-	-	-	-	0
Biface reduction errors	4 [33.3%]	6 [50.0%]	2 [16.7%]	-	12
Biface finishing flakes	257 [57.9%]	117 [26.4%]	63 [14.2%]	7 [1.6%]	444
Normal uniface retouch flakes	39 [34.8%]	5 [4.5%]	60 [53.8%]	8 [7.1%]	112
Ventral uniface retouch flakes	1 [100%]	-	-	-	1
Fragments	217 [53.6%]	146 [36.1%]	34 [8.4%]	8 [2.0%]	405
Other	4 [40%]	3 [30%]	1 [10%]	2 [20%]	10
Totals	550 [52.4%]	302(303) [28.8%]	171 [16.3%]	27 [2.6%]	1050(1051)

(53.8%) as compared to the tools (73.7%). Conversely, Onondaga chert is much more abundant among the debris (25.7%) than among the tools (14%). Ellis (1979) has suggested elsewhere that this incongruity may be monitoring differential time elapsed since access (either directly from sources or indirectly through exchange or other mechanisms) to these different sources. Put simply, it may be that while a certain percentage of tools are being produced on Onondaga, not enough time has elapsed for the tools to be used, worn-out and discarded in frequencies equal to their manufacture or resharpening. However, there are suggestions that the situation is much more complex.

Examination of Table 9.2 shows that the Onondaga debris assignable to the reduction of specific tool classes is highly biased towards bifacial debris. Indeed, only five uniface retouch flakes on Onondaga were recovered. As indicated in the last chapter, biface reduction produces much more debris than unifacial

Table 9.4: Other Biface Flake to Channel Flake Ratios, Areas B, C, D.*

AREA	COLLINGWOOD	ONONDAGA	BAYPORT	UNKNOWN	TOTAL
B	9.4 to 1 (1062 to 113)	11 to 1 (22 to 2)	5.8 to 1 (29 to 5)	1 to 1 (2 to 2)	9.1 to 1 (1115 to 122)
C	12.8 to 1 (268 to 21)	23.7 to 1 (142 to 6)	6.6 to 1 (66 to 10)	3.5 to 1 (7 to 2)	12.4 to 1 (483 to 39)
D	15.9 to 1 (238 to 15)	N/A (2 to 0)	N/A (0 to 0)	N/A (0 to 0)	16 to 1 (240 to 15)

* includes only items from the excavated areas which would be recovered in 1/4" mesh. N/A: not applicable.

reduction. Therefore, the higher representation of the Onondaga debris in contrast to its occurrence among the tools/preforms is, in part, a product of the greater emphasis on the alteration of bifaces of that material. Nonetheless, this total still represents an inconsistency as there is not such a bias among the tools on Onondaga. Only 37.5% of the Onondaga tools from the excavated area are bifaces as compared to 57.1% among the Collingwood items. Therefore, if anything we should expect a greater emphasis on biface debris among the Collingwood material but this result is not the case.

The above suggests that the larger representation of Onondaga among the debris is due to the fact that much more biface alteration was occurring relative to tool/preform discard. Again, this could be due to less time elapsed since access to Onondaga in comparison to sources such as Collingwood. Yet, the fact there are four Onondaga unifacial tools and only five uniface retouch flakes indicates this interpretation is an oversimplification. If there was less time elapsed since access to Onondaga, one would expect a relatively greater representation of this material among the debris from unifaces as well as bifaces.

Perhaps a more parsimonious explanation is achieved if we consider the actual bifacial tools from the excavated area. The Collingwood items are exclusively fluted bifaces whereas the Onondaga includes another tool form: an alternately bevelled biface (Table 9.1). On this basis, we would suggest that the bias towards bifacial debris among the Onondaga versus the Collingwood may be due to an emphasis on the production of bifacial tools other than fluted points -- tools whose reduction would produce more debris. Some support for this explanation is derived if we consider the frequency of channel flakes with regard to other biface debris for the various materials by site areas (Table 9.4). At Area C there are many more other Onondaga biface flakes per channel flake (23.7 to 1) than among the other raw materials (<12.8 to 1) suggesting much of the biface debris may not be from point manufacture. Further, in comparison to other site loci where the bifacial sample consists virtually entirely of point fragments (e.g. Area B), the ratio for Onondaga at Area C is almost double that found in most of those areas. Therefore, we would suggest that the

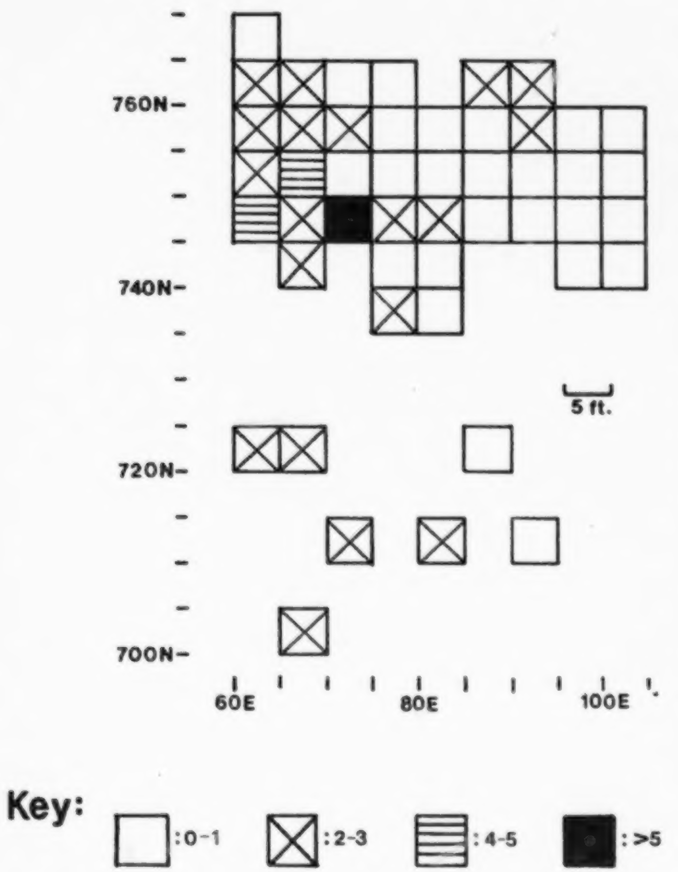


Figure 9.2: Density map of Kettle Point chert debris, area C.

incongruity at Area C between the representation of Onondaga among the debris and tools as compared to other materials is due to an emphasis on biface alteration and particularly, of non-fluted bifaces. It may have no relationship to time elapsed since procurement of Onondaga. In fact, if the Onondaga unifaces and uniface debris are any guide, the low representation of the latter may indicate a larger period of time elapsed since access to Onondaga.

Relative to many other sites or site areas, the Area C assemblage includes a high percentage of bifaces (Table 9.1). Since biface debris is produced in much larger absolute quantities in comparison to uniface debris, we should expect Area C to have a relatively high debris to tool ratio and this result is indeed the case (23.3 to 1). In fact, as will be detailed in Chapter 12, this ratio exceeds that at Area B despite the fact the Area B assemblage is more heavily dominated by bifaces themselves. Again, it is plausible to suggest that this incongruity is due to a greater emphasis on the reduction of bifacial tools other than points. That is, some of the reduction at Area C, and particularly among the Onondaga items where the debris to tool ratio is actually 43.1 to 1, was oriented towards producing bifacial tools which produce more debris in manufacture and resharpening than is the case with fluted points. In any case, the percentage of bifaces in Area C (ca. 50%) is intermediate between those at Area B (ca. 79%) and Area D (ca. 25%). As we shall see, it is not surprising therefore that of the debris assignable to biface or uniface reduction, the percentage of the former at C is also intermediate.

Excluding finds outside the excavated area, the ratio of channel flakes to finished

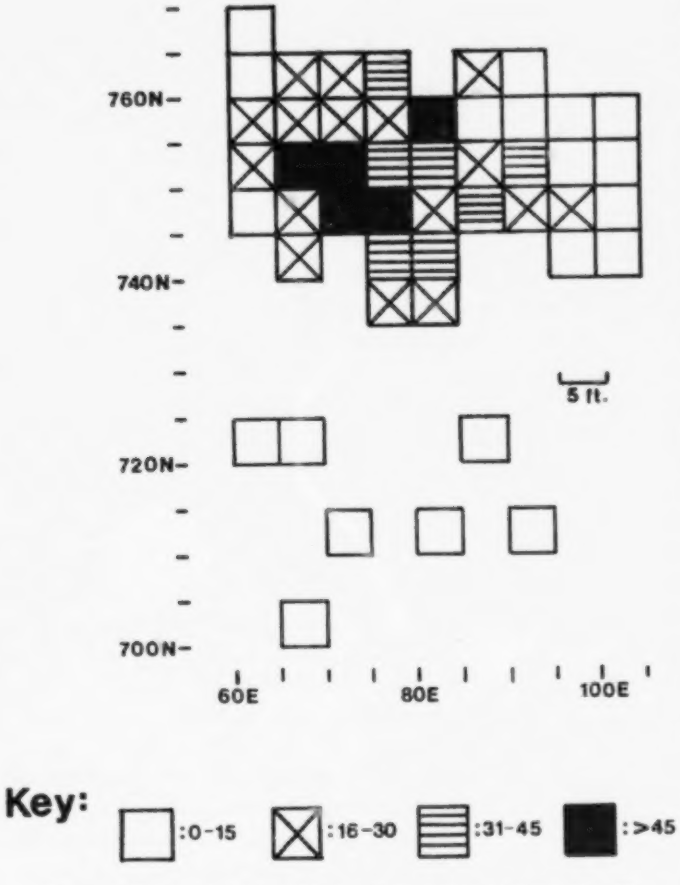


Figure 9.3: Density map of Paleo-Indian waste flakes, area C.

points at Area C is around 2.4 to 1, regardless of whether or not the two used channel flake segments are included. As with similar ratios at Area B, this might suggest comparable numbers of points were produced as were discarded at C (16 items in the excavated area). However, as noted in the Area B discussions, the tendency of these items to collapse in manufacture, among other problems, makes these estimates highly suspect. Assuming two channel flake removals per point and taking into account variability in raw materials, channel flake platform ends indicate at least seven bifaces were fluted. As at Area B, a comparable estimate (six bifaces) is produced by taking combined channel flake length, assuming a 53.3 mm per face flute length, and accounting for the use of different raw materials (Ellis and Payne 1995: Table 4). In any case, using the channel flake platform ends as a minimum estimate of the number of bifaces fluted, there are suggestions of a high success rate in fluting. Excepting a small preform tip end whose removal by an overshot termination would not impair point finishing, only an Onondaga preform may have been discarded because of fluting error. Since some channel flake platforms would not be recovered in 1/4" mesh, the totals suggest a fluting failure rate of less than ca. 14% -- very close to the estimates at Area B.

Kettle Point and Sub-Greywacke

As previously noted, some Kettle Point chert and sub-greywacke items were located within the excavated area. In the absence of any definitive evidence for later prehistoric occupations at Area C, and despite the absence of any diagnostic Paleo-Indian items on these materials at the site and yet the recovery of many later diagnostics on that material from the

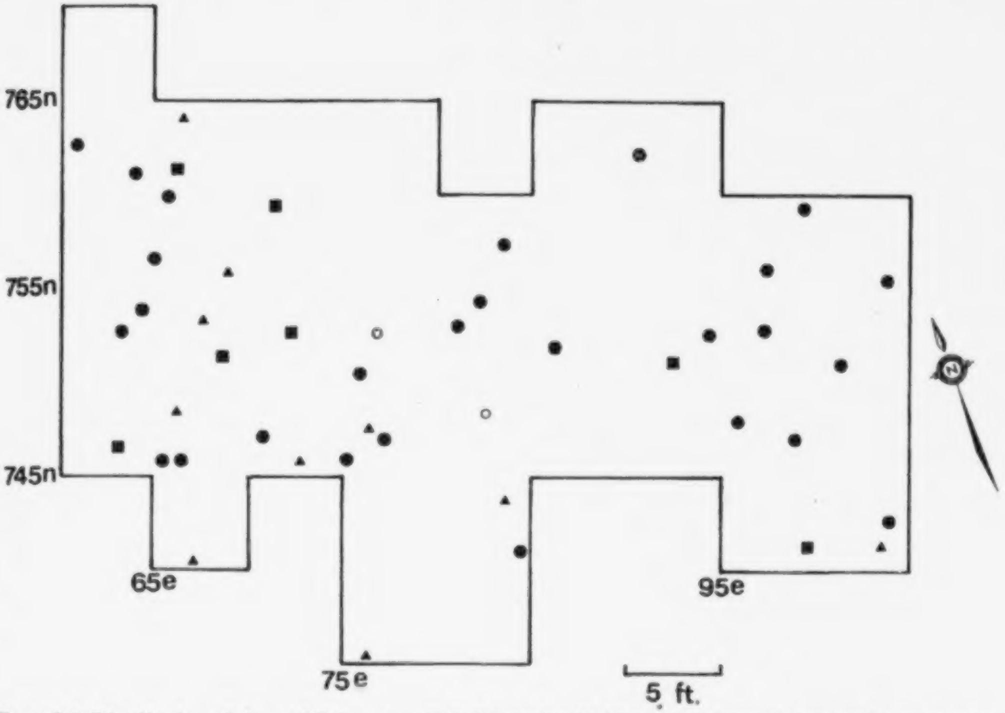


Figure 9.4: Distribution of channel flakes, area C. Solid circles: Collingwood chert; Triangles: Bayport chert; Squares: Onondaga chert; Open Circles: unidentified cherts.

site as a whole, it is plausible to suggest at least some of this material is associated with the Paleo-Indian occupation of the area.

The Kettle Point items recovered consist of only 70 pieces of debris and a single tool. This debris tends to cluster in the southwestern part of the main excavated area (Figure 9.2). Since the definite debris from Paleo-Indian occupation at Area C also reaches its highest densities in this area (Figure 9.3), a Paleo-Indian association is once again suggested. For the most part, this debris consists of items comparable to the biface finishing (N=23) and small, thin fragments (N=31) found among the definite Paleo-Indian debris. However, the remaining 16 pieces of debris are much different than any other Paleo-Indian debris at the site and falls into three classes. Five are large (0.5 to 7.5 gm) primary or secondary "decortation" flakes or chunks exhibiting remnants of the unflaked material units surfaces while another five items are simple chunks or shatter which ranges up to about 1.25 gm in weight. The remaining six items are relatively large flakes (0.4 to 1.25 gm) with right-angled platforms and are apparently from core trimming. With one exception, items in these three classes were recovered exclusively from the southwestern part of the main excavation block. Moreover, all are of the same colour, banding and texture. These data suggest all could be from the same intial raw material piece. The primary flakes exhibit much curved and battered original surfaces of the raw material and clearly indicate use of a small pebble from a secondary source such as till. It seems likely this material represents the simple, expedient use of local sources of that nature.

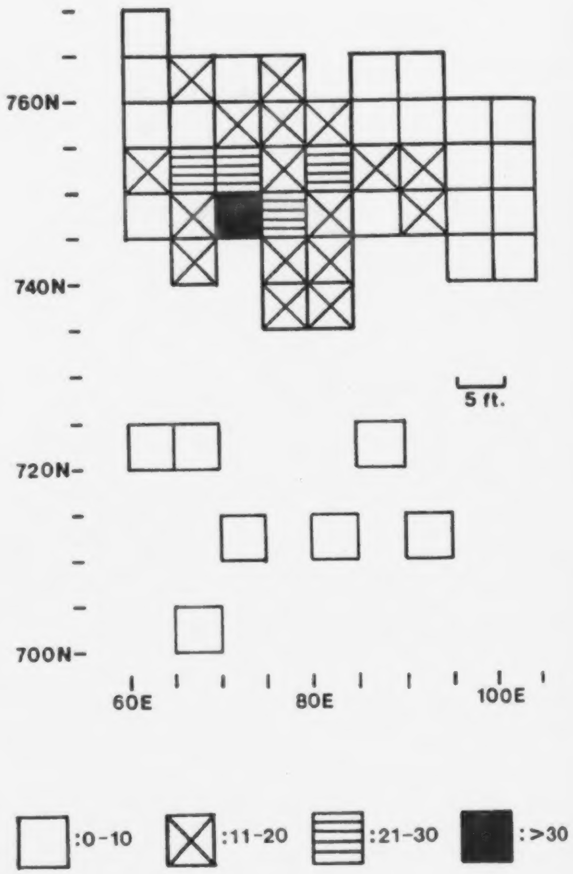


Figure 9.5: Density map of biface debris excluding channel flakes, area C.

The goal of this pebble's reduction is not clear. It is plausible to suggest use of local sources to produce flakes suitable for expedient use. In this regard, the single Kettle Point chert tool from the area is a simple, retouched flake or "blade" with suggestions of use along the lateral and distal flake margins from square 755/65. This tool also exhibits a "cortical" surface remnant suggesting use of a pebble from a local secondary source. However, this tool is on a piece of Kettle Point chert much different in colour and texture than that represented among the waste. Moreover, the Kettle Point biface finishing flakes from Area C suggest the material was also used for more formal tools such as bifaces.

The use of Kettle Point chert by Paleo-Indian knappers would not be surprising since, and as previously noted, a small number of artifacts and waste on this material are reported from sites such as Fisher (Storck 1997) and also occur as rare isolated finds. However, these items are extremely rare compared to Onondaga, Collingwood or even Bayport chert use on Ontario fluted point sites. Deller's (1979:15, 1989) suggestion that this material was rarely used because the primary sources were under the level of Lake Algonquin/Ardtrea still seems viable. Furthermore, the material from Area C suggests use of local secondary sources which could easily account for the few known Early Paleo-Indian tools on this material and is consistent with a primary source inaccessibility. In fact, it may be of significance that Kettle Point usage is much more common on Late Paleo-Indian sites which are known to occur on the Lake Algonquin/Ardtrea bed (Deller 1988; Ellis and Deller 1986) and thus, presumably post-date draining of that lake and exposure of the primary sources.

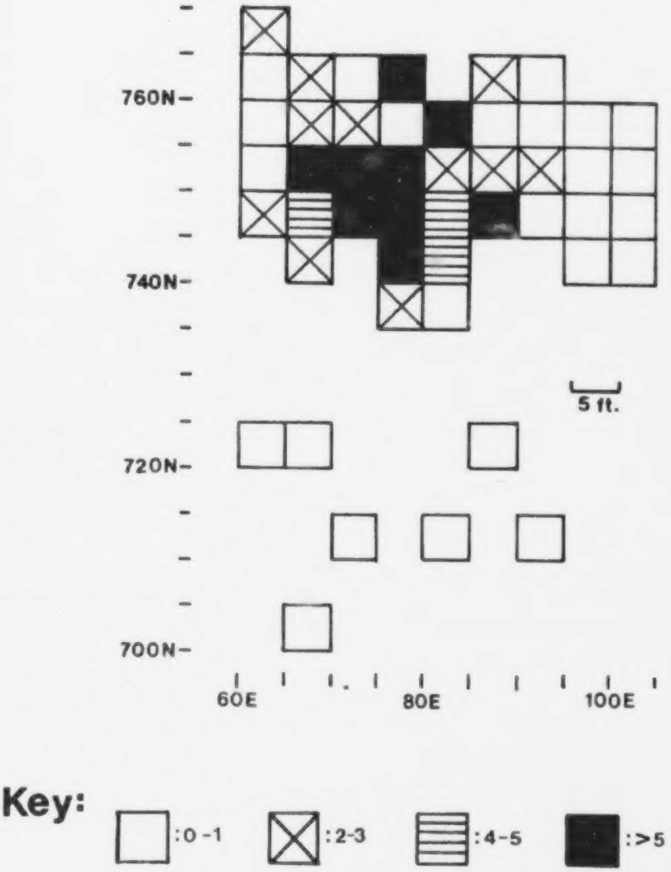


Figure 9.6: Density map of uniface retouch flakes, area C.

The association of the seven sub-greywacke flakes with the Paleo-Indian occupation at Area C is also suggested by the fact six of them come from the southwest area of the main excavated block where the densest concentrations of definitive Paleo-Indian debris are to be found. These are all relatively large (ca. 0.4 to 1.25 gm) flakes. Excepting a fragment, they include 4 biface trimming flakes and two items with right-angled platforms. As stated earlier, minor use of sub-greywacke by Paleo-Indians has been suggested at other sites such as Thedford II (Deller and Ellis 1992b:87), so its association with the occupations at Parkhill would not be unexpected. It is possible its use was for expedient flake tools. However, this debris may also represent the trimming of larger cobble tools such as choppers similar to those on coarse-grained rocks reported from sites such as Debert (MacDonald 1968:104-105) and Vail (Gramly 1982:42-43). Yet, no definitive evidence for the use of these tools in Ontario has been reported to date.

Assemblage Summary, Area C

Collingwood chert is the dominant material employed but, in contrast to Area B, materials such as Onondaga and Bayport are better represented. Moreover, there is some suggestion of the use, albeit in very minor quantities, of local secondary sources of both Kettle Point chert and the meta-sediment sub-greywacke for expedient tools. Yet, a few biface flakes on the former material suggests limited use for more formal tools such as points.

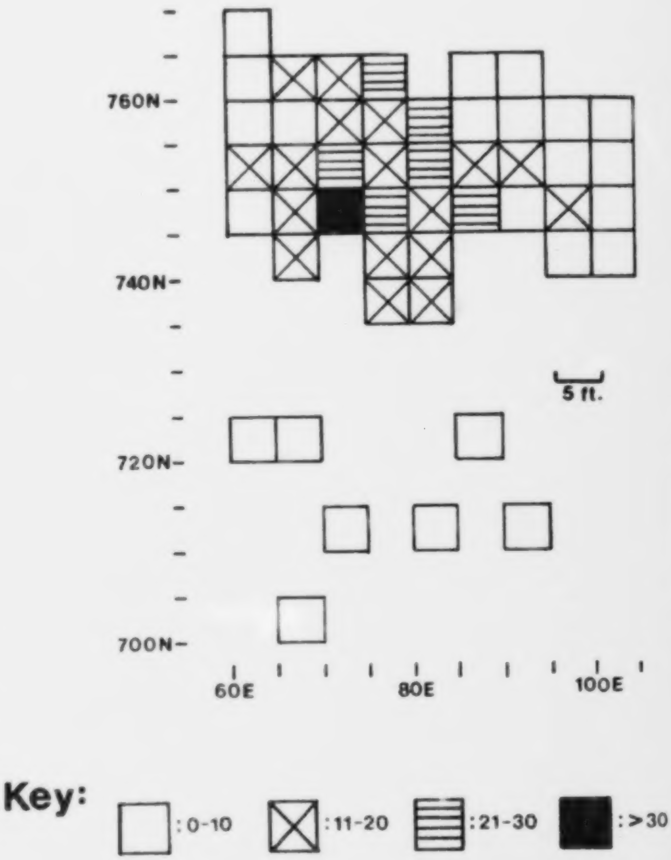


Figure 9.7: Density map of Collingwood chert waste flakes, area C.

Another contrast with Area B is a wider variety of tool forms. These include not only a range of unifacial items but also some bifacial tools such as large alternately beveled bifaces. Nonetheless, fluted bifaces represent the largest single class of tools recovered (46.6%). Only ca. 50% of Area C was excavated but among the surface collections, fluted bifaces make up a similar percentage (45.5%). This similarity suggests the excavated assemblage is representative of activities in the area as a whole. While the Area C fluted biface percentage is not as high as at Area B, it is certainly higher than that reported from most northeastern sites as will be discussed in more detail later. Also, the frequency at Area C matches the frequencies of fluted bifaces that Judge (1973) found was characteristic of his relatively specialized Folsom armament areas. Again, and as at Area B, this conclusion does not mean that Area C is identical to Judge's (1973) armament sites since both point rehafting as well as manufacture were stressed at C.

Given the above considerations, Area C also can be regarded as a relatively specialized activity locus where fluted bifaces were manufactured and repaired.

Features

Feature 35

Only one possible Paleo-Indian feature was located at Area C. This feature was situated at the south end of square 745/70 (Figure 9.1). In plan it was roughly circular and about 1.25 ft. in diameter. In profile, it had gently tapering sides which extended to a narrowed bottom some 1.07 ft. into the subsoil. The fill included a few pebbles and consisted of a very dark brown (10 YR 2/2), charcoal-flecked sand. One small piece of charcoal (0.12 gms) was identified as beech. If this is a Paleo-Indian feature, this charcoal must be regarded as intrusive.

The feature contained two Onondaga biface finishing flakes and a Collingwood channel flake. The plowzone above the feature coincided with the densest concentration of waste in the excavated area (Figure 9.3). Tools were absent from the feature but an Onondaga chert beak recycled from a large parallel-sided end scraper, was recovered from the plowzone directly above it (Figure 9.1).

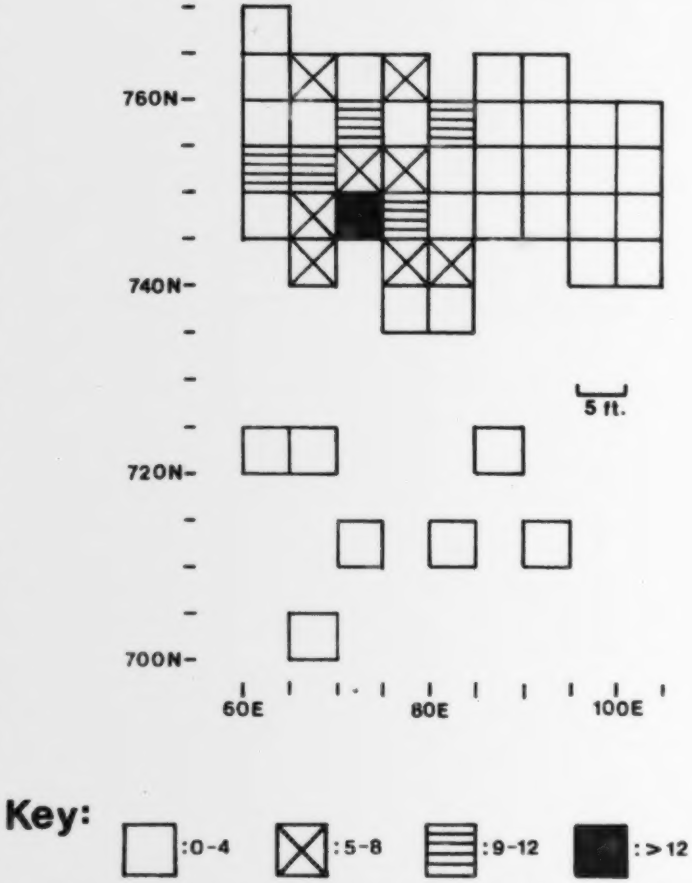


Figure 9.8: Density map of Bayport chert waste flakes, area C.

Spatial Distributions

Several factors constrain our understanding of the spatial distributions at Area C. First, the area excavated is relatively small in comparison to the known surface distribution of artifacts. Therefore, it is difficult to derive inferences on the overall layout of the area. Second, the actual area of continuous excavation is limited. This problem makes it difficult to evaluate the patterns in artifact distributions seen within this small area. Third, the density of material overall is somewhat low so isolating any clustering which is statistically significant in general will be difficult. Finally, there is evidence in one area of extensive disturbance subsequent to the Paleo-Indian occupation. Examination of the tool/preform distributions (Figure 9.1) shows a decided lack of this material throughout most of the area between the 95 and 105E grid lines excepting the western edge and the southeast corner. Debris is also rare throughout this area (Figures 9.4-9.9). Indeed, only channel flakes seem relatively common (Figure 9.4). This bare space corresponds exactly to a large, roughly squarish, charcoal-flecked stain (Feature 38) which extended on average down to 0.5 ft. into the subsoil. Much historic period material occurred in the area, including nails, iron scrap, glass and ceramics. This area apparently represents the remains of a burned, historic structure and in fact, the former owners of the site indicate a "milkshed" once stood in that vicinity. Since there is a very low to non-existent density of Paleo-Indian material corresponding to this structures location, it is plausible to suggest its construction involved cleaning the area of the earlier material, perhaps in digging a foundation.

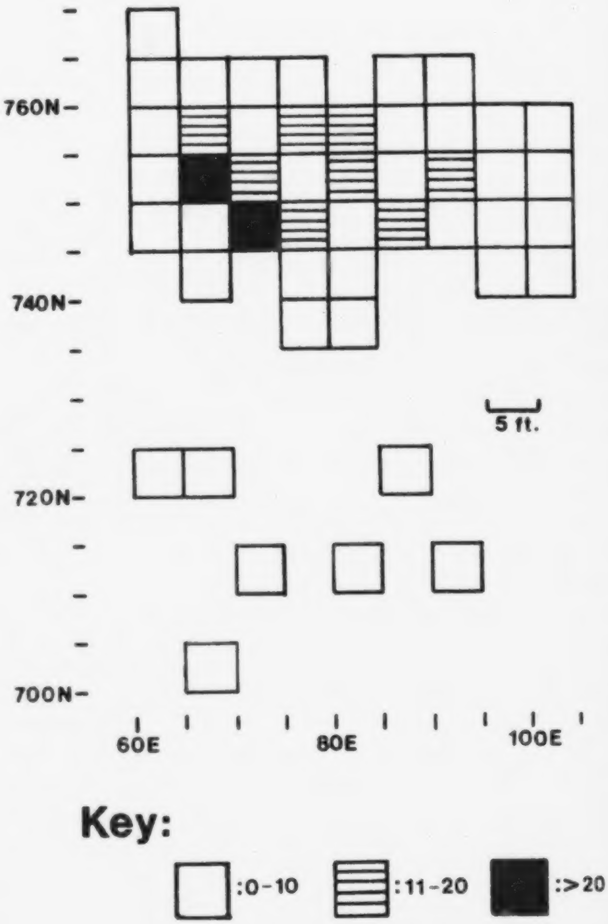


Figure 9.9: Density map of Onondaga chert waste flakes, area C.

If there was disturbance in building this historic structure, it is possible the removed material was dumped somewhere else in the area and perhaps, in the area excavated. That such might have occurred is suggested by some aspects of the refit patterns. There are few tools which refit from Area C and one matchup actually includes the channel flake which matches to two fragments of a fluted preform noted earlier. Most of these fragments are actually close together (Figure 9.10; Table 9.5). Excluding the trianguloid end scraper with a snapped bit which was subsequently recycled into a narrow end scraper (25.06 ft. separation of bit and recycled haft) all items are within 10.87 ft. (5.20 ft. average separation; Table 9.5). The recycling of the trianguloid haft and its use for other tasks could account for the wider separation of that item rather than say, the effects solely of ploughing. Uniface retouch flakes from the site, as well as a single matchup

Table 9.5: Refit Distances, Area C.*

REFITS	N	RANGE	MEAN	STANDARD DEVIATION
Tools/preforms: total sample	7	0.91-25.06	8.03	8.191
Tools/preforms: ancient breaks	4	0.91-25.06	9.71	10.566
Tools/preforms: recent breaks	3	2.02-10.87	5.80	4.561
Tools/preforms: excluding recycled end scraper outlier	6	0.91-10.87	5.20	3.589
Channel flake segments	11	4.67-26.16	17.83	10.856
Uniface retouch flakes and biface thinning flake segments	8	3.68-26.56	10.97	7.542

* all measurements are in feet.

of a biface thinning flake distal end, also seem in relatively close juxtaposition with one notable exception (Figure 9.11; Table 9.5). In contrast, and of more interest here, are the refitted segments of channel flakes. These are more widely separated, averaging 17.83 ft. apart (Table 9.5), and of importance, they seem to be predominantly separated on an east to west axis (Figure 9.12). This direction is at right-angles to the direction the site was ploughed and contrasts with every site or site area we have examined in the past for such orientation and the experimental evidence alluded to earlier which suggests items are moved predominantly in the direction of plough movement. Since channel flakes are one of the few items which are common at the east end of the main excavation block even with the historic disturbance, it may very well be that many of them originated in the area of disturbance and were moved farther west during the historic period disturbance.

Given the above constraints, we are reluctant to attribute much significance to the spatial patterns within the excavated area. Nonetheless, we should note some possible patterns in these data. First, three of the four piercers or gravers (two are in two pieces) were recovered in close juxtaposition in the north-central part of the excavated area (Figure 9.1). A tendency for these tools to occur together or more accurately, as multiples in close juxtaposition, is also evident at Area D (see next chapter), at the nearby Thedford II site (Deller and Ellis 1992b: Figure 87) and at the Banting Site (Storck 1979: Figure 3). Moreover, a similar trend is suggested at sites farther afield. Examination of the maps of artifact distributions at Debert suggests these tools often occur in clusters of two or more items at that

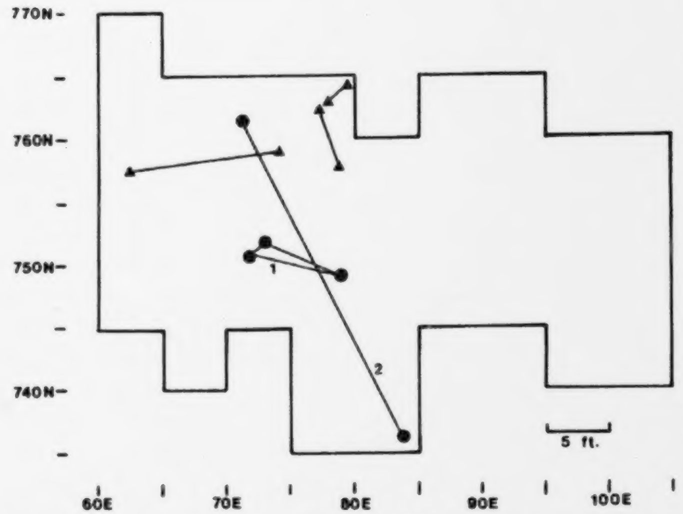


Figure 9.10: Tool/preform refits, area C. Triangles: items broken by post-depositional disturbances; Circles: items separated by Paleo-Indian activities. 1- Fluted preform fragments & channel flake; 2- Trianguloid end scraper recycled into narrow end scraper and snapped bit.

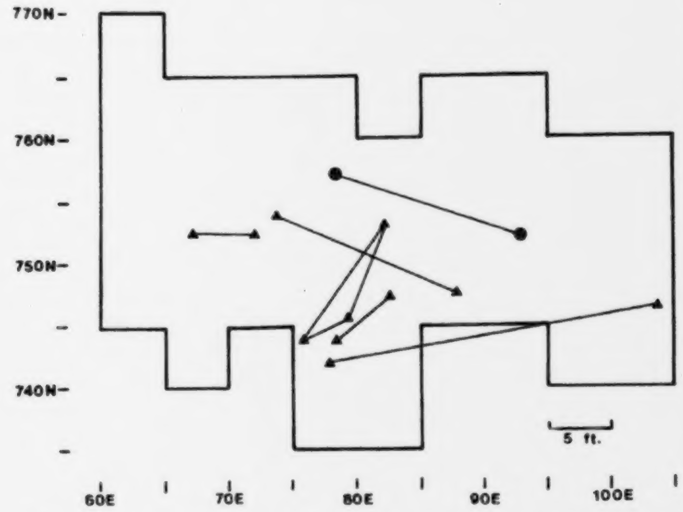


Figure 9.11: Refits of uniface retouch flake and biface thinning flake sets. All items initially separated by Paleo-Indian activities. Triangles: uniface retouch flake sets; Circles: biface thinning flake set.

site, notably in Sections A, C, F, G and J (MacDonald 1968). This clustering is, perhaps, not unexpected for this tool form. These tools are delicate items and probably had very short use-lives in comparison to most other tool forms. Thus, they represent a tool form where more than one separate tool would be frequently needed to carry out a task of short duration. Moreover, their restricted and clustered distribution at Area C might suggest also that these tool locations represent primary discard areas where the tools were actually used.

Another example of artifact forms with apparently restricted and clustered distributions includes the fluted bifaces. Examination of Figure 9.1 suggests these items are largely found in the central part of the area excavated. This pattern becomes clearer when a density contour of these items is constructed in the same manner as was the case for Area B (Figure 9.13). This map reveals that the fluted bifaces cluster in the central part of the area. As with the piercers, the co-occurrence of two or more of these items in close juxtaposition might not be unexpected. They consist largely, but not totally, of finished point fragments. In

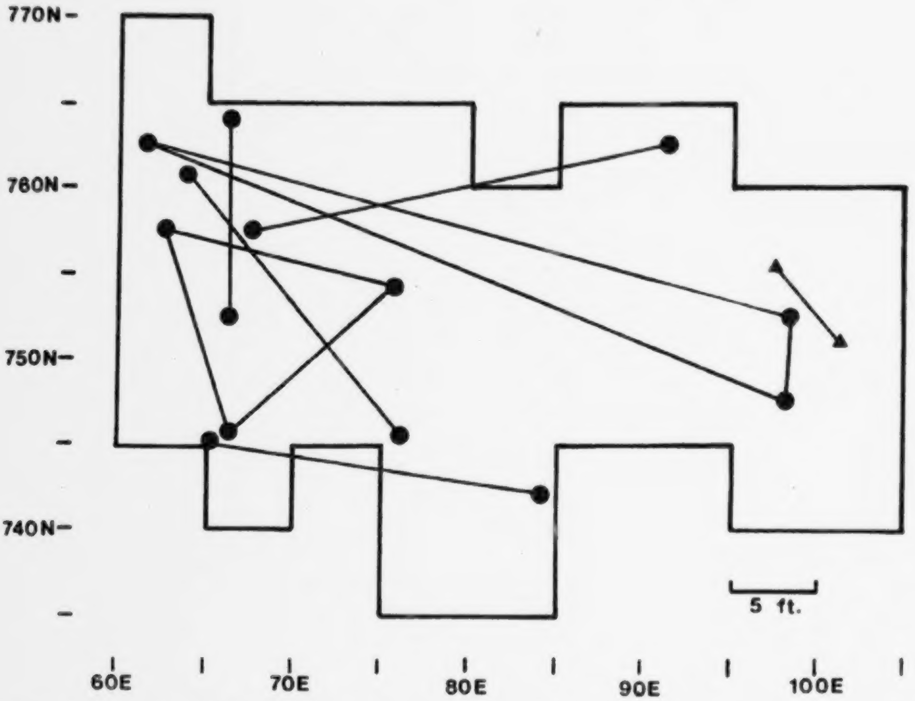


Figure 9.12: Refits of channel flake segments. Triangles: items broken by post-depositional disturbances; Circles: items initially separated by Paleo-Indian activities. Note number of east-west cross-mends which do not follow the direction the area was ploughed (north to south).

other words, they were not used at the area (i.e. they had a short, indeed non-existent, application-life in the area). They are present through re-hafting activities rather than through being used. As with the gravers, this clustering suggests therefore, that the areas where these items were found may represent actual primary discard locations.

Third, and in direct contrast to the fluted bifaces, the other tools at Area C actually seem to cluster around the periphery of the excavated area (Figure 9.14) -- that is, and as can be seen comparing Figures 9.13 and 9.14, these two categories of artifacts have almost exclusive distributions. Despite the post-occupational disturbances at the site, this exclusive distribution seems a very unusual distribution and one which we do not believe would result simply from ploughing. It is notable also that a tendency for fluted bifaces to be in separate areas from other, largely unifacial, tools is not unexpected. It is common to find areas of almost exclusive fluted point manufacture or rehafting activities separate from the other items. For example, separate areas of fluted biface related activities occur at sites such as Murphy (Jackson 1997) and Culloden Acres (Ellis and Deller 1991; Ellis et al. 1992:92-95). Closer to home Area B at Parkhill has a very high percentage of

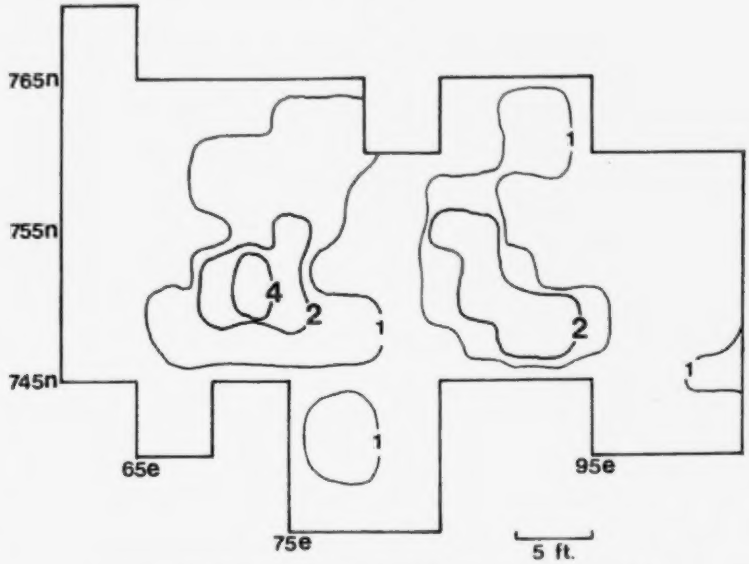

765n
755n
745n
65e
75e
95e
1
1
1
1
2
2
4
5 ft.

Figure 9.13: Contour density map of fluted bifaces, area C.

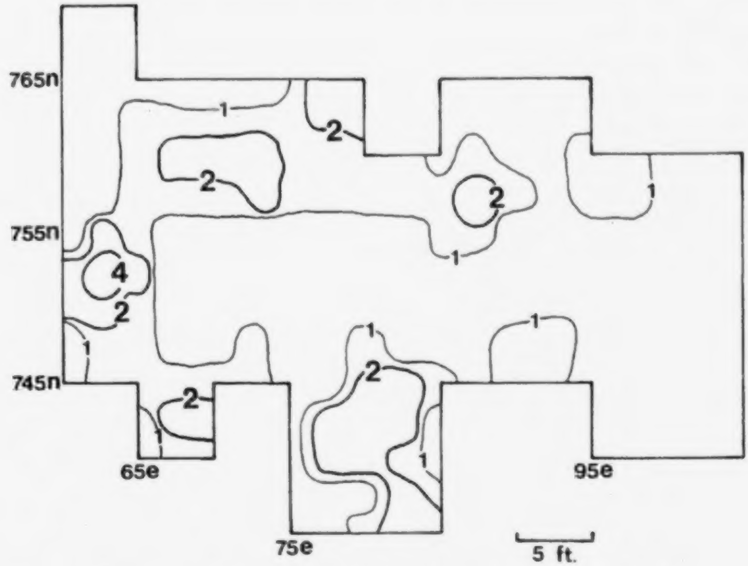

765n
755n
745n
65e
75e
95e
1
1
1
1
1
1
1
1
2
2
2
2
2
2
4
5 ft.

Figure 9.14: Contour density map of all other tools, area C.

fluted bifaces and can be linked by refits to Area D where fluted biface use is much less prevalent. There are several potential reasons for such a separation but one possible explanation suggested by MacDonald (1968:133) is simply that fluted biface production produces more flaking debris. Therefore, in order for the debris not to interfere with other activities fluted biface production at least would be separated spatially from those other activities. On the other hand, there is no evidence biface debris such as channel flakes concentrates in the same areas as the fluted bifaces at the site (see, for example, Figure 9.4) and given the tiny nature of all flakes, it seems to be stretching the evidence to consider the presence of debris a major problem.

Finally in terms of the spatial distributions, as noted previously there is only one good candidate for a Paleo-Indian feature at Area C. This feature was located near the southwestern margin of the excavated area. It is notable that most debris concentrates in that same area (see Figures 9.1, 9.3). In other words, the concentration of artifactual material with features seen at Area B and at other sites is repeated at Area C.

CHAPTER 10

AREA D

Introduction

Area D is located on a low knoll overlooking a shallow gully or swale on the north. As indicated earlier, in the area northwest of D this gully was a small, linear, marshy area (Area F) at the time of the investigations (Figure 1.3). Area D is highly productive in terms of surface finds. Plotted material indicates the area covers from roughly 360 to 530E and 20S to 125N on the grid system or an area of approximately 22,000 sq. ft. (2000 m^2). In other words, the area is very large, being by itself approximately three times as large as the largest other excavated site in the area: Thedford II (Deller and Ellis 1992b).

Only a very small portion of Area D (625 sq. ft.) was excavated (Figures 1.3 and 10.1). Several excavated squares were isolated test units but two small contiguous blocks of 275 and 150 sq. ft. were opened up. These were located respectively near the south margin and in the center of the known artifact distribution. We will refer to these as the southern and northern block excavations respectively. While one of the more centrally located squares was devoid of Paleo-Indian material, it is notable that all peripheral squares yielded Paleo-Indian tools and/or flaking debris. Most squares were excavated simply using 1/8" mesh in the top two-tenths of a foot in the plowzone. However, in the southern block of squares, 1/8" was used in the subsoil because of the dense concentration of materials.

In addition to the Paleo-Indian artifacts, a very large amount of material left by subsequent occupants was recovered. This material includes items representative of occupation in the area over a long time span. Notably well-represented are: Early Archaic occupations as represented by two bifurcate-based points; Middle Archaic occupations as represented by a stemmed point reminiscent of Stanly/Neville forms (Dincauze 1976) and some notched Brewerton-like forms (e.g. Ritchie 1971); Late Archaic occupations including point forms associated with the Broadpoint (Kenyon 1980a, 1980b) and Smallpoint (Ellis et al. 1990; Spence and Fox 1986) complexes; and Early Woodland, Meadowood Phase (Ritchie 1955) materials. The sample of Genesee type Broadpoints and preforms at Area D has been described in detail by Fisher (1987a, 1987b). At least three features representing these later occupations were encountered in the excavated area.

One feature (#42) contained a dense concentration of flaking debris. Although no diagnostics were recovered from the feature (its flotation samples have yet to be processed), the base of a side-notched point suggestive of Middle Archaic affiliation was recovered at the base of the ploughzone immediately above the feature. It was a pit feature located in the northern block excavations in squares 45 & 50N/460 & 465E.

Another later cultural feature (#28/31) was from the southern block excavations in 0N/460E. This feature was a pit hearth surrounded by fire-reddened sand. During its construction, earlier Paleo-Indian materials (several flakes and one tool) had become

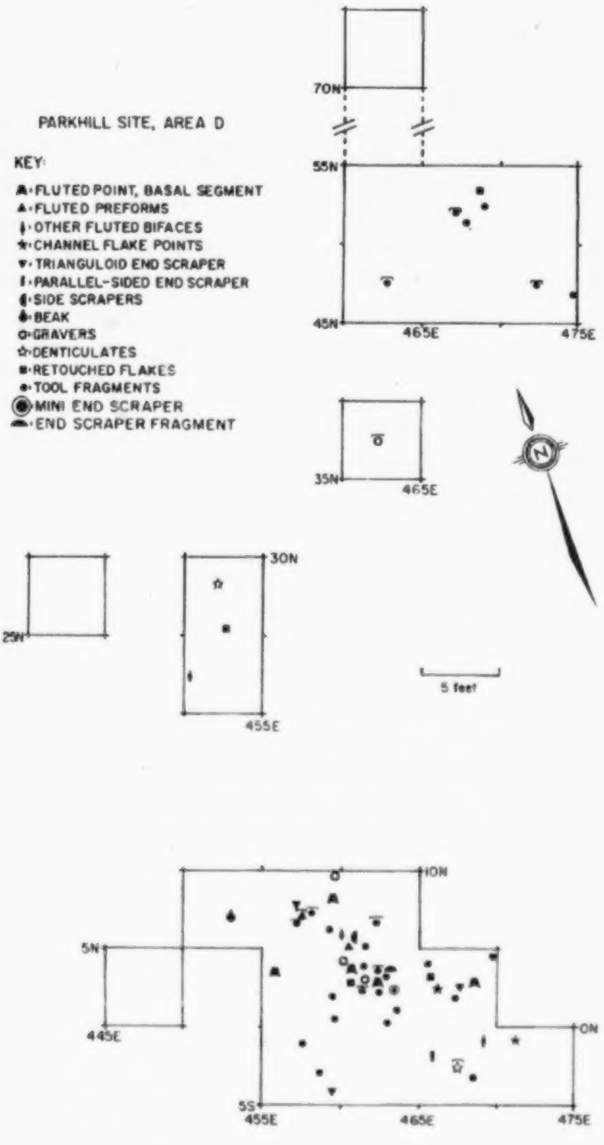

PARKHILL SITE, AREA D
KEY:
▲ • FLUTED POINT, BASAL SEGMENT
▲ • FLUTED PREFORMS
• OTHER FLUTED BIFACES
★ • CHANNEL FLAKE POINTS
▼ • TRIANGULOID END SCRAPER
• PARALLEL-SIDED END SCRAPER
• SIDE SCRAPERS
• BEAK
○ • GRAVERS
☆ • DENTICULATES
■ • RETOUCHED FLAKES
● • TOOL FRAGMENTS
◉ MINI END SCRAPER
• END SCRAPER FRAGMENT
70N
55N
45N
465E
475E
35N
465E
30N
25N
455E
5 feet
10N
5N
0N
445E
5S
455E
465E
475E

Figure 10.1: Distribution of tools/preforms, area C. "Hatted" items are approximate locations.

incorporated in the feature fill. In addition to Kettle Point and Onondaga chert waste flakes, this feature also contained a large, biface thinning flake on the meta-sediment, sub-greywacke and the corner fragment of a small, serrated point on Onondaga chert. When the feature contents were examined by Ellis in the 1980's, it was assumed the small corner-notched serrated point was an Early Archaic one which, like the Paleo-Indian items, had been incorporated into the feature fill. Since Broadpoint groups in the area consistently used sub-greywacke in the manufacture of large, refined, biface tools (Kenyon 1979, 1980a), the flake on that material was used to suggest an association with the Broadpoint component at Area D. Therefore, the resulting ^{14}C date on this feature of 3400±210 B.P. (I-8866) was suggested to pertain to the Broadpoint Archaic (Deller et al. 1986). However, the subsequent publication of details on Smallpoint Archaic materials, and especially, the materials recovered from the Crawford Knoll site (e.g. Kenyon 1989), as well as a more thorough understanding of Early Archaic corner-notched horizon material in Ontario (e.g. Ellis et al. 1991), makes this association questionable. In particular, it is quite clear the small corner-notched point is not Early Archaic because it is much too small and is not of the same quality of workmanship. However, it is identical in size, as well as the presence of serrations, to those Smallpoints recovered from the Late Archaic Crawford Knoll site (Kenyon 1980b). It is also worth noting that the ^{14}C date of 3400±210 B.P. is also statistically identical to the date from Crawford Knoll of 3480±120 B.P. Overall, we now believe the feature to be terminal Archaic rather than Broadpoint associated (see Ellis 1998 for discussion).

The third feature (#23/23A) was also located in the southern excavation block and has been reported in detail elsewhere (Ellis 1994c). It was a hearth which primarily occurred in squares 5S/455E and 0N/455E. This feature was quite irregular at the plowzone/subsoil interface due to rodent, root and agricultural activities. However, when taken down, it resolved into a well-defined, ca. 6 ft. long, linear feature surrounded by fire-reddened soil. Charred wood from the feature included beech, slippery elm, rock elm, white ash, black ash, and basswood. Large amounts of fire-cracked rock were also included.

During the feature's construction, several Paleo-Indian tools and much flaking debris had become incorporated -- particularly at the north end where the feature had cut down into an old, infilled drainage or erosional channel which extended down some 0.8 ft. into the subsoil. This linear channel, which was referred to a Feature #30, ran or sloped down from southeast to northwest across the southern excavation block in the direction of the gully or Area F. This channel apparently began in the eastern portion of square 460E, extended north across the western portion of ON/460E and the eastern portion of 0N/465, and continued into square 5N/455E. It was about 2 ft. wide, had become infilled with sand, and was capped in some areas with a thin clay lens. The cultural material in the channel fill included many pieces on raw materials diagnostic of Paleo-Indian occupation at the site (e.g. Collingwood chert; see below) and included many small waste flakes. It was clear in the field that the material in the channel had been largely eroded into the channel from surrounding areas. This factor accounts at least partially (many of the Paleo-Indian items [22/45 or 48.9%] were actually recovered in the ploughzone) for the dense concentration of tools in a southeast to northwest array (Figure 10.1) in the southern excavation block and indicates the channel was formed after the Paleo-Indian occupation. The channel fill also included some later material which was not clearly in any cultural feature which was subsequent to, and cut down into, the erosional feature. Notable here was the basal section of a tiny (12.1 mm wide stem) corner-notched point on Onondaga chert which is most certainly also assignable to the Smallpoint Archaic Crawford Knoll type. In addition, a small complete preform (44.5 by 22.0 by 10.1 mm) on Kettle Point chert was found in this channel which is identical in size, outline and workmanship to preforms reported from sites with Crawford Knoll points (e.g. Ellis et al. 1990: Figure 4.25a-d). Since the channel trends in the direction of Area F, it is possible it was initially cut during Nipissing times although the presence of Smallpoint Archaic materials indicates it was in existence, and material continued to be deposited or eroded into it, until Late Archaic times. However, the fact that Feature #23/23A cut into it, indicates this erosional feature was mainly infilled prior to the feature's construction around 3000-2500 B.P. (see below and Ellis 1998).

Besides flaking debris, the later cultural material presumably associated with Feature #23's actual use and construction included solely the base of a thin, well-made, shallowly side-notched, Onondaga chert point. This item is a good example of the Early Woodland Meadowood type (Ritchie 1971). Three ^{14}C dates were obtained on the cultural feature. Charcoal from near the interface (0-.3 ft. into the subsoil) was dated at 1725 +/- 100 B.P. (I-8865). However, this part of the feature clearly had been disturbed by agricultural activities. In fact, the fire-cracked rock at that depth was neatly aligned following the orientation of cultivation and narrow, parallel scars left by the tines of an ammonia spreader were clearly visible. Moreover, samples from the top of the feature contained modern corn pollen. A second date was obtained on scattered charcoal distributed throughout the feature from the interface to its bottom at 0.7 ft. This reading was 2980 +/- 105 B.P. (I-8867). Because of the incorporation of disturbed material, it is also thought to be unreliable although it would not be out of line with other reported Meadowood dates (see Jackson 1986). The third date was made solely on charcoal from undisturbed areas deep within the feature (0.3 to 0.6 ft.) As such, it should provide the most reliable estimate of the feature's age. This date was 2485 +/- 100 B.P. (I-8868) and is perfectly in line with the majority of Meadowood dates elsewhere (see Spence and Fox 1986). In any case, for our purposes here the main point is that the feature indicates the erosional channel was open until at least ca. 3000 B.P.

Table 10.1: Distribution of Kettle Point and Collingwood Chert, Feature #30 Excavation Units.

CONTEXT	KETTLE POINT CHERT	COLLINGWOOD CHERT
Plowzone	607	197
Subsoil 0-.4'	126	238
Subsoil .4-.8'	19	86
Subsoil >.8'	9	17

Despite this evidence of later occupations at Area D, it seems relatively easy to sort out the Paleo-Indian associated lithic items which are not on Collingwood chert. Bayport chert diagnostics are exclusively Paleo-Indian at Area D. Onondaga chert items are associated with the later occupations in the area. However, as noted in earlier discussions, the diagnostic Paleo-Indian tools and waste on this material are weathered in comparison to the later diagnostics and this allows relatively easy assignment of non-diagnostic flaking debris. Only Kettle Point chert is problematical. Yet, no Paleo-Indian diagnostics on this material are known at the site. In addition, indications from other sites and site areas such as Area C are that Paleo-Indian use of this material was minor. More importantly, there is contextual data from Area D which suggests little if any of the Kettle Point debris is Paleo-Indian associated. In particular, plotting of material by depth in the area of the Feature #30 erosional channel (excluding cultural feature fill), indicates Kettle Point items are more common higher in the channel and were deposited primarily after the definite Paleo-Indian Collingwood debris (Table 10.1). In addition, as previously noted, an undoubted preform for a Late Archaic Smallpoint on Kettle Point chert was also recovered from the channel clearly suggesting post-Paleo-Indian use of that chert in the same area. Therefore, we believe exclusion of this

Table 10.2: Tool/Preform Totals, Area D.*

TYPE/CLASS	COLLINGWOOD	ONONDAGA	AYPORT	UNKNOWN	TOTALS
Fluted points	12 [92.3%]	1 [7.7%]	-	-	13
Fluted preforms	2 [100%]	-	-	-	2
Other fluted bifaces	4 [100%]	-	-	-	4
Unfluted preforms	2 [100%]	-	-	-	2
Channel flake points	2 [100%]	-	-	-	2
Large alternately bevelled bifaces	1 [100%]	-	-	-	1
Small alternately bevelled bifaces	1 [100%]	-	-	-	1
Backed bifaces	1 [100%]	-	-	-	1
Marginally retouched bifaces	-	-	-	-	-
Biface fragments	1 [100%]	-	-	-	1
Trianguloid end scrapers	13(17) [86.7%]	2(3) [13.3%]	-	-	15(20)
Large parallel-sided end scrapers	2(3) [40%]	1 [20%]	2 [40%]	-	5(6)
Laterally notched end scrapers	2 [66.6%]	1 [33.3%]	-	-	3
Fluted end scrapers	-	-	-	-	-

Table 10.2: Continued.

TYPE/CLASS	COLLINGWOOD	ONONDAGA	BAYPORT	UNKNOWN	TOTALS
Bi-bitted end scrapers	2 [100%]	-	-	-	2
Narrow end scrapers	3 [100%]	-	-	-	3
Offset end scrapers	1 [100%]	-	-	-	1
Other end scrapers	4 [100%]	-	-	-	4
Simple beak	2 [100%]	-	-	-	2
Hafted perforator	-	-	-	-	-
Piercers or gravers	4 [66.7%]	2 [33.3%]	-	-	6
Denticulate	2 [100%]	-	-	-	2
Notch/borer/ denticulate	3 [100%]	-	-	-	3
Concave side scrapers with spurs	-	-	-	-	-
Other side scrapers	6 [100%]	-	-	-	6
Retouched Flakes	3 [100%]	-	-	-	3
Other Unifaces & Fragments	32 [97%]	-	-	1 [3%]	33
Totals	105(110) [91.3%]	7(8) [6.1%]	2 [1.7%]	1 [0.9%]	115 (121)

* totals in rounded brackets includes items counted in their original and recycled form.

material from Paleo-Indian discussions should create little bias.

Artifact Assemblage

Tools and Preforms

Some 115 Paleoindian tools or fragments thereof were recovered from Area D (Table 10.2). The vast majority of these items are on Collingwood chert. A relatively high percentage of the Area D tools (51.3%) are from surface collections outside the excavated area. Indeed, Area D has been more thoroughly surface-collected than any of the site areas at Parkhill and certainly, of the eastern areas at the site (see Chapter 12). This is partially due to the fact it was a favoured collecting locus of those individuals who discovered the site but also, because it was planted in crops at the time of the major excavation work which allowed easy surface examination.

Fluted bifaces are relatively rare at Area D, comprising 16.5% (19 of 115) of the total assemblage and 19.6% (11 of 56) of the assemblage from excavated locations. It is notable that the percentage of fluted bifaces from surface collection outside the excavated areas (13.6%) is lower although comparable to that excavated suggesting the area as a whole did not emphasize fluted point reduction or rehafting as much as the other main excavated areas. The finished points consist largely (61.5%) of basal fragments but three tip ends are also included. One of the latter was subsequently recycled into a fluted point blade. It is notable that channel flakes can be refit onto three of the points. In two cases, a blade and a base, the channel flakes came from the vicinity of Feature #9 in Area B, forming a clear link between these two site areas. The final refit consists of a channel flake from Area D which fits one of the snapped point bases. This evidence strongly suggests the item was made in the area, used off the site and broken, and then, the base was returned to the area in the haft and discarded. It might suggest Area D was occupied for a relatively lengthy time since similar matchups could not be made in other areas.

The fluted preforms both consist of small tip ends, one of which was removed by an outre-passé flute termination. The other simply snapped off, probably collapsing during flute removal. There are also two unfluted preforms. Other biface tools are well-represented and notably include a complete and a mid-section fragment of small points made on channel flakes. The single alternately beveled biface is the tip end fragment whose recycling involved placing a massive borer or spur near one corner.

The major unifacial tool category represented is simply fragments (Table 10.2). There is a much higher percentage of these fragments in Area D than in the other site localities. This is undoubtedly due to the small area excavated. With larger excavated areas, and consequently, more complete recovery, it probably would be possible to refit many of these fragments and assign them to certain specific tool types or classes. As it stands, most of these items appear to be from side scrapers and retouched flakes.

Among the unifacial tools assignable to types or classes, trianguloid end scrapers predominate. Uniface retouch flakes were found which fit onto the bit ends of two of the trianguloid end scrapers (e.g. Figure 6.9g). While most of the unrecycled trianguloid forms are complete, three are bit ends snapped off in

Table 10.3: Debris Totals Area D Including 1/8" & Flotation Items.*

DEBRIS TYPE	COLLINGWOOD	ONONDAGA	BAYPORT	UNKNOWN	TOTALS
Channel flakes	15(21)	-	-	-	15(21)
Normal biface thinning flakes	18(19)	-	-	-	18(19)
End biface thinning flakes	1	-	-	-	1
Biface reduction errors	1	-	-	-	1
Biface finishing flakes	604	2	-	-	606
Normal uniface retouch flakes	149(150)	5	2	3	159(160)
Ventral uniface retouch flakes	3	-	-	-	3
Fragments	615	1	1	-	617
Other	24	-	-	-	24
Totals	1430(1438)	8	3	3	1444(1452)

*totals in rounded brackets include subsequently used examples.

use and one is a lateral half produced by a recent break. Moreover, there are two of these items which were recycled into piercers or gravers (one at the bit end and one at the haft end), and a snapped bit which was recycled into a narrow end scraper at the juncture of the snap and a lateral edge. The large parallel-sided end scraper type is represented by five snapped bits. In addition, there is another bit of that type which was recycled and is counted in the beak total. Among the other end scrapers are the miniature end scraper on a uniface retouch flake, the thumbnail end scraper with spur and burin-like blows at the haft end, the single end of blade scraper, and a bit fragment from a form of unknown type.

Flaking Debris

Excluding items subsequently used as tools, 1444 pieces of definite Paleo-Indian flaking debris were recovered from Area D (Table 10.3). Most of this material is very small and was only recovered because of the extensive use of 1/8" mesh in the subsoil in some areas of the southern excavation block. This bias is evident in the fact that only 508 flakes are large enough to have been recovered in 1/4" mesh (Table 10.4).

Table 10.4: Debris Totals Area D Excluding 1/8" & Flotation Items.

DEBRIS TYPE	COLLINGWOOD	ONONDAGA	BAYPORT	UNKNOWN	TOTALS
Channel flakes	15(21)	-	-	-	15(21)
Normal biface thinning flakes	18(19)	-	-	-	18(19)
End biface thinning flakes	1	-	-	-	1
Biface reduction errors	1	-	-	-	1
Biface finishing flakes	218	2	-	-	220
Normal uniface retouch flakes	68(69)	5	2	2	77(78)
Ventral uniface retouch flakes	3	-	-	-	3
Fragments	148	1	1	-	150
Other	23	-	-	-	23
Totals	495(503)	8	3	2	508(516)

*totals in rounded brackets include subsequently used examples.

Only four channel flake basal segments or platform ends were recovered from the excavated area suggesting that at least two bifaces were fluted at this location. Since both preforms from the excavated area are only very small tip ends, one might conclude that few if any items were broken and discarded due to errors in fluting. However, sampling error represents a very real problem here.

Overall, and as will be discussed more in later sections, the flaking debris has more in the way of uniface-related debris in comparison to Areas B and C and this emphasis mirrors the fact the tool assemblage also has more of a bias to unifaces (Tables 8.4, 12.3) and lower debris to tool ratios (Tables 12.4 and 12.5).

Spatial Distributions

The small area excavated provides little detailed information on the spatial distribution of Paleo-Indian artifactual materials. Moreover, even within the two small continuous blocks of squares excavated, the material has been highly subjected to disturbance by later site occupants and root and rodent disturbances. In addition, and as noted earlier, there had been considerable disturbance in the southern excavation block by erosional processes.

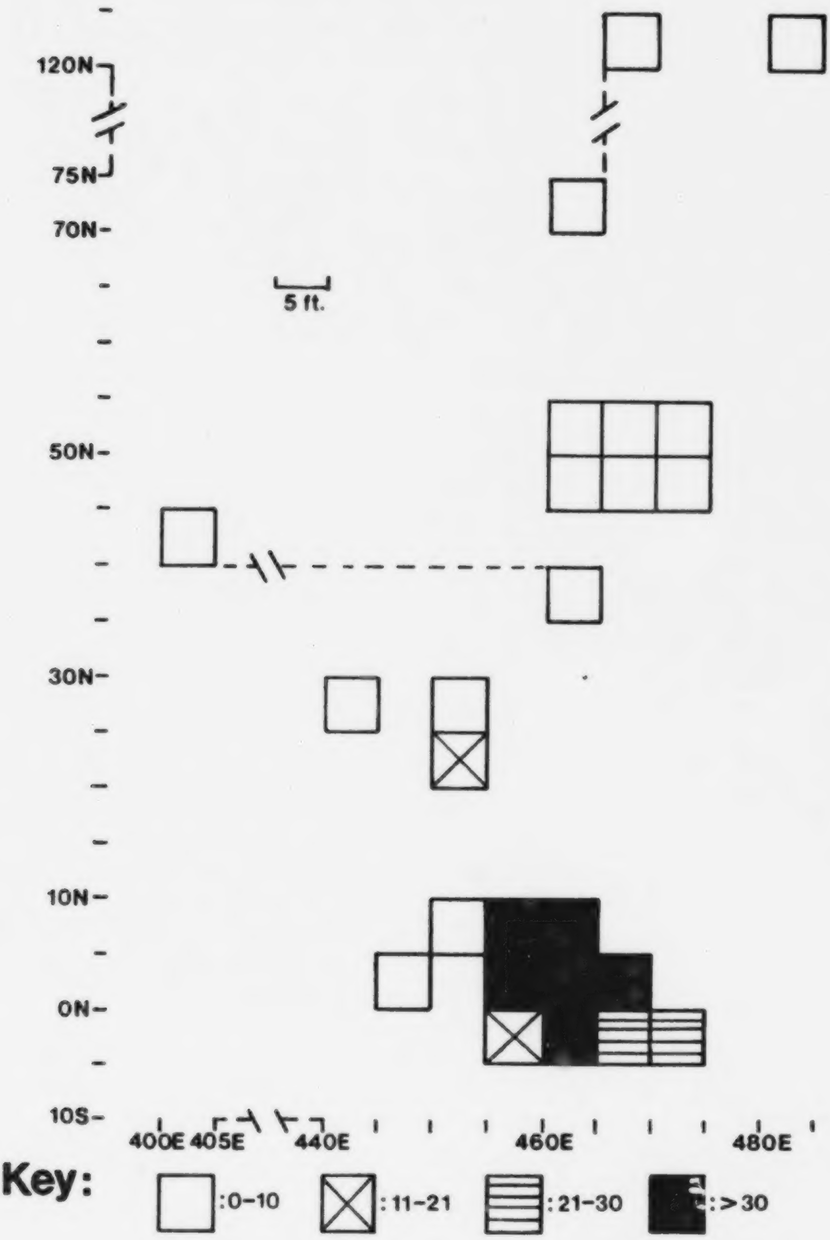
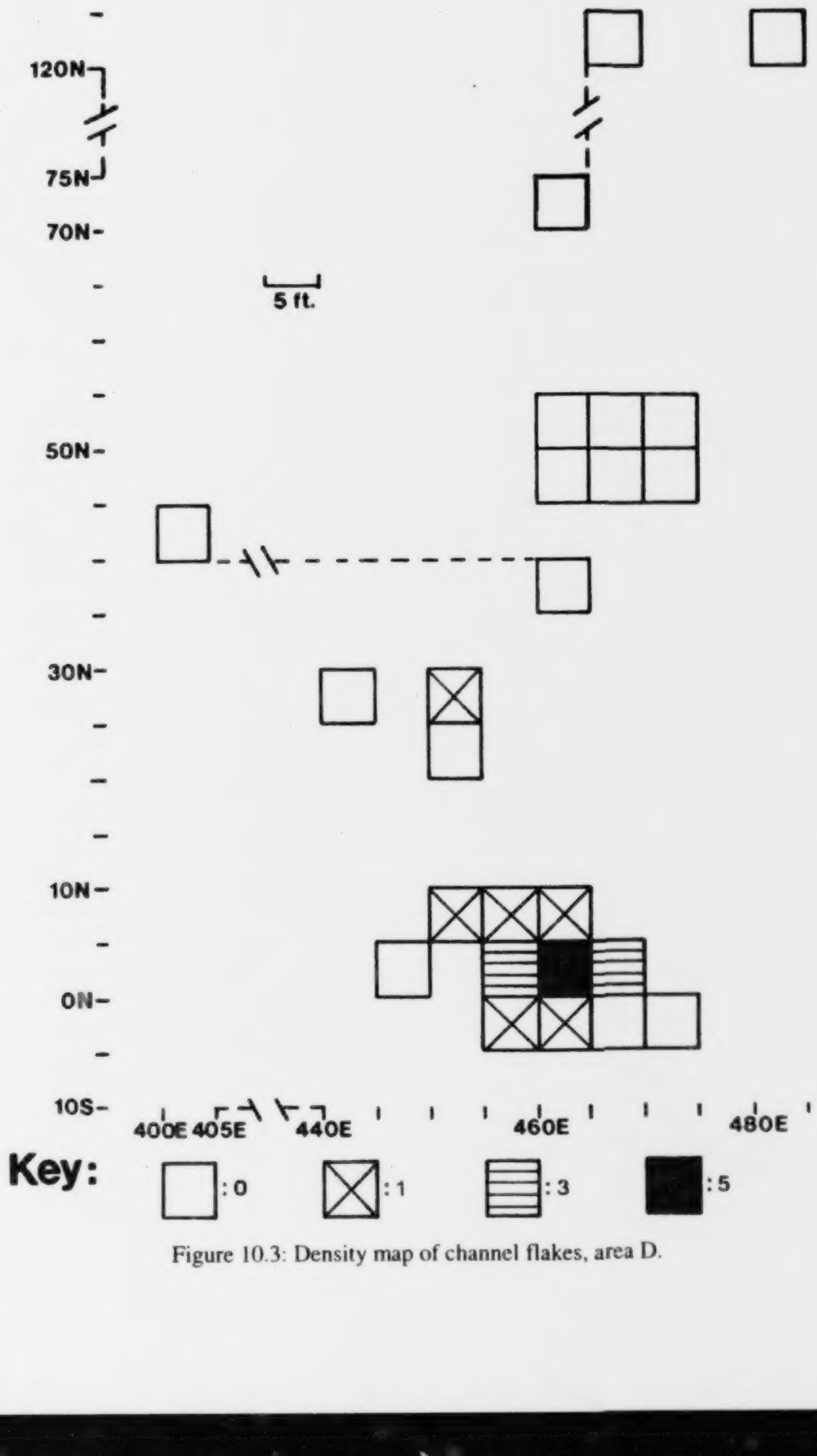

120N
75N
70N
5 ft.
50N
30N
10N
0N
10S
400E
405E
440E
460E
480E
Key:
:0-10
:11-21
:21-30
:>30

Figure 10.2: Density map of Paleo-Indian waste flakes, area D.


120N
75N
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5 ft.
50N
30N
10N
0N
10S
400E
405E
440E
460E
480E
Key:
: 0
: 1
: 3
: 5

Figure 10.3: Density map of channel flakes, area D.

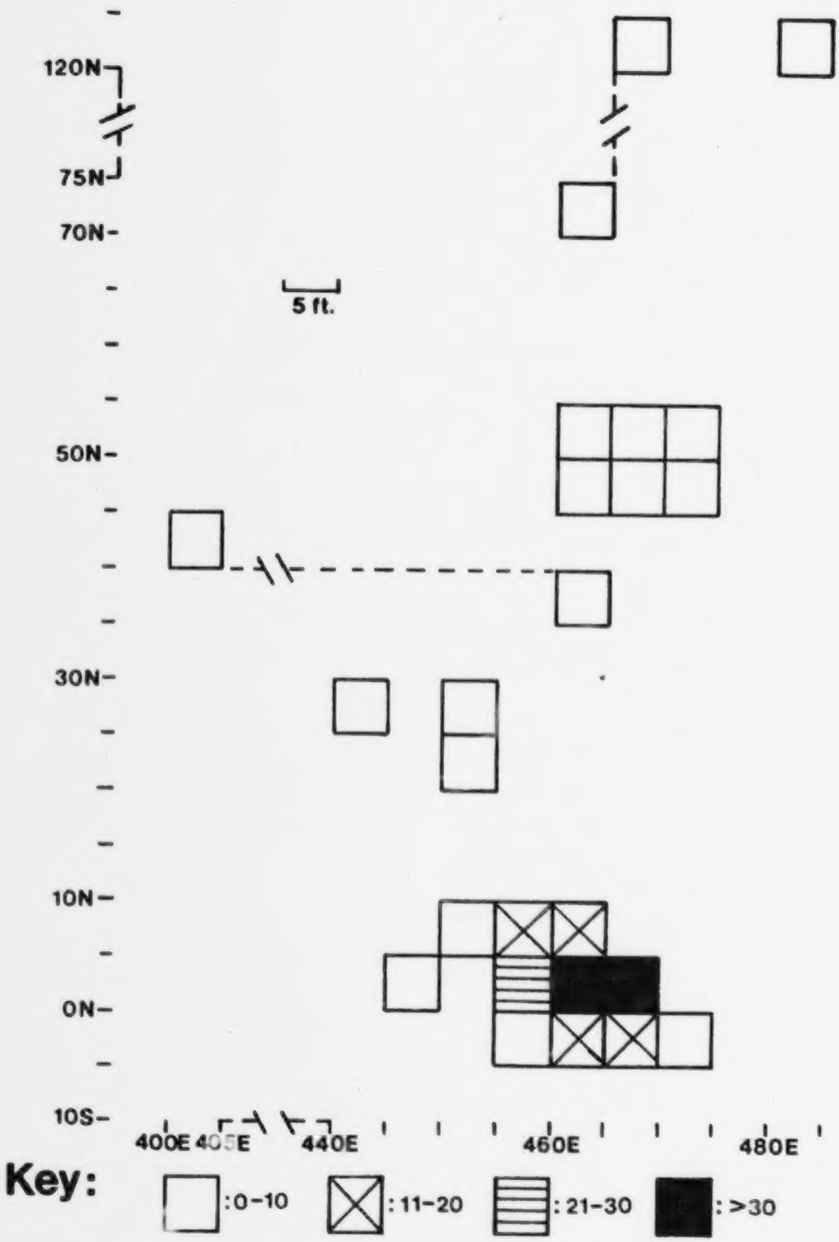

120N
75N
70N
5 ft.
50N
30N
10N
0N
10S
400E
405E
440E
460E
480E
Key:
:0–10
:11–20
:21–30
:>30

Figure 10.4: Density map of biface debris excluding channel flakes, area D.

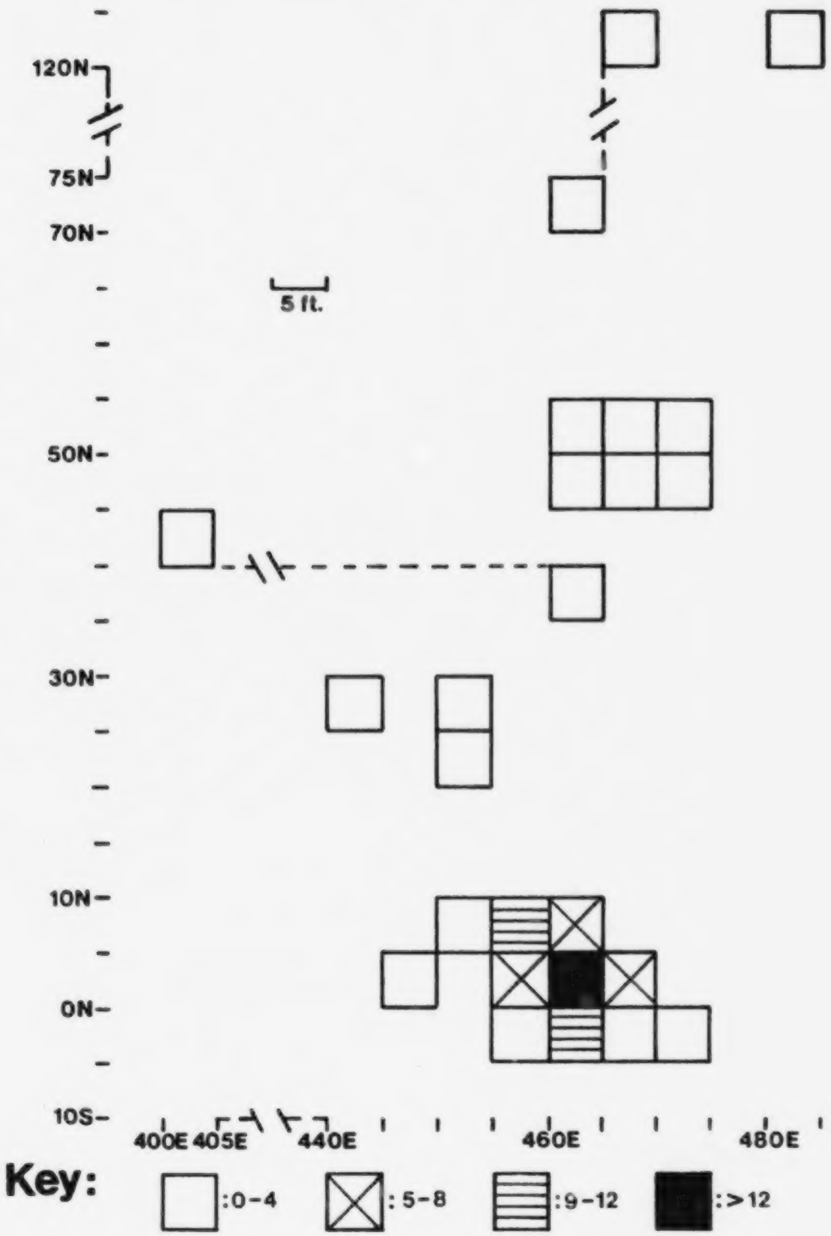
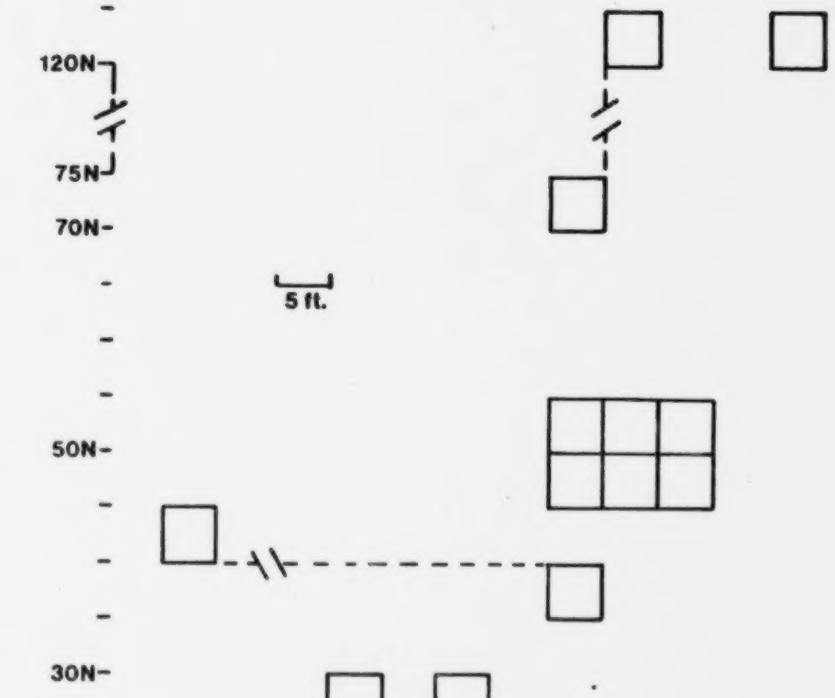

120N
75N
70N
5 ft.
50N
30N
10N
0N
10S
400E
405E
440E
460E
480E
Key:
:0-4
: 5-8
:9-12
:>12

Figure 10.5: Density map of uniface retouch flakes, area D.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75N
70N
5 ft.
50N
30N
10N
0N
10S
400E
405E
440E
460E
480E
Key:
:0-20
:21-40
:41-60
:>60

Figure 10.6: Density map of Collingwood chert waste flakes, area D.

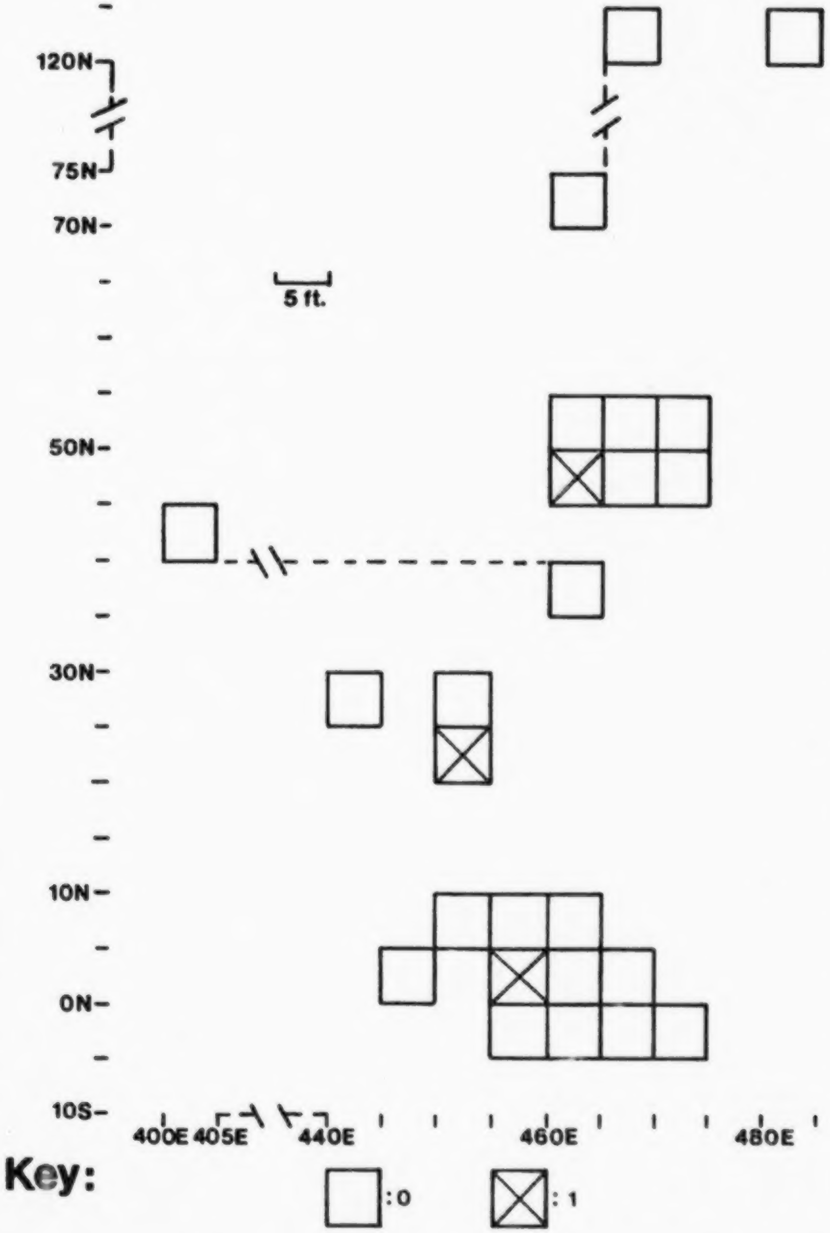
120N
75N
70N
5 ft.
50N
30N
10N
0N
10S
400E
405E
440E
460E
480E
Key:
:0
:1

Figure 10.7: Density map of Bayport chert waste flakes, area D.

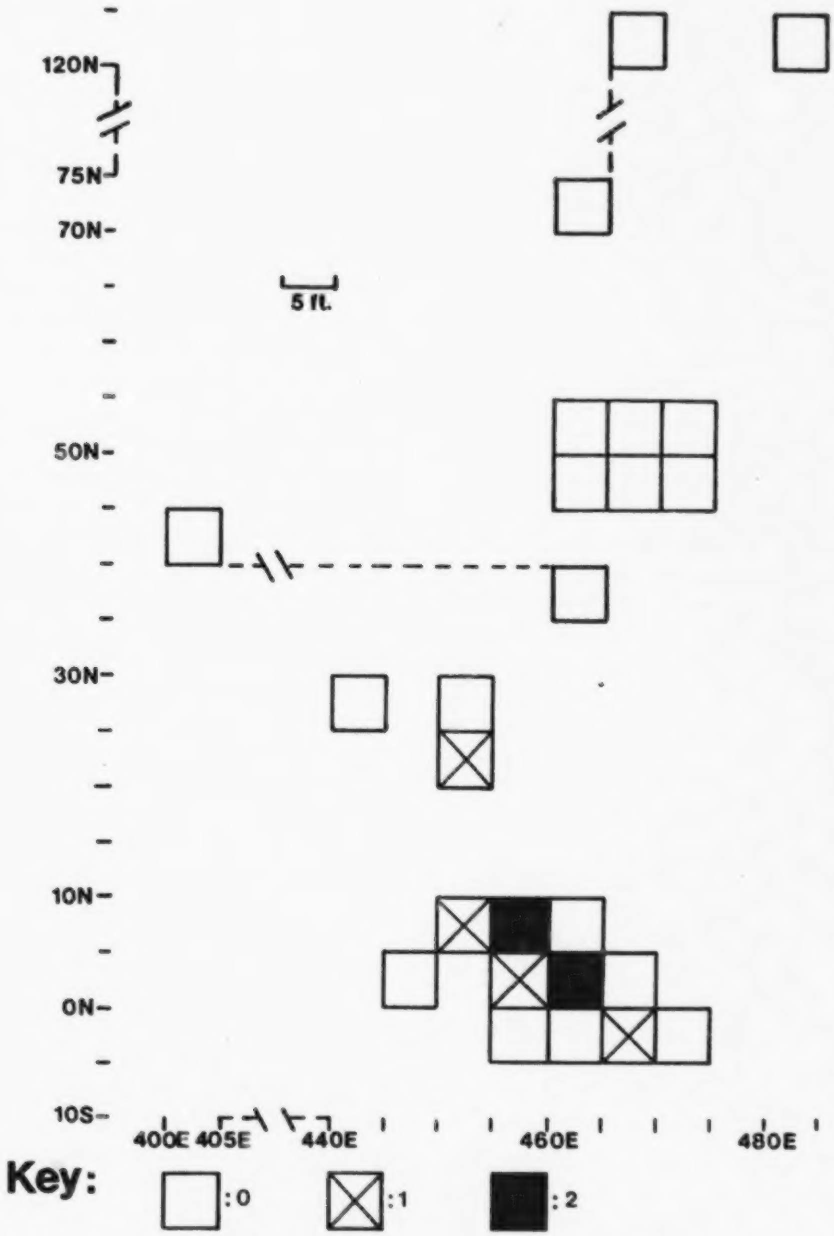
120N
75N
70N
50N
30N
10N
0N
10S
5 ft.
400E
405E
440E
460E
480E
Key:
:0
:1
:2

Figure 10.8: Density map of Onondaga chert waste flakes, area D.

Given the above considerations, inferences on spatial distributions must be limited. In general, the variability in the material recovered from each excavated unit suggests Area D may consist of several, relatively discrete concentrations of cultural material in close juxtaposition. For example, the southern excavation block contained relatively dense concentrations of cultural material outside of the channel itself whereas the more centrally located block yielded only a few scraper fragments and some intervening test units such as 70N/460E were totally devoid of tools (Figure 10.1). Variation between the two excavation blocks in the recovered tool and debris forms also suggests spatial variability in lithic related activities. For instance, the central block has solely unifacial tools and is low in waste flakes (Figures 10.1 to 10.8). The latter is to be expected where uniface reduction predominates. In contrast, the southern block contains a wider range of tool forms and more waste such as channel flakes although many uniface flakes also occur in that area (Figures 10.1 to 10.8).

Finally, it is notable that at least two tool forms are distributed in patterns similar to those noted in other site areas. Both of the small channel flake points were recovered in close juxtaposition (about six feet apart). Moreover, the miniature end scraper on a uniface retouch flake was recovered from the square adjacent to that containing the westernmost channel flake point. Although erosional processes may be playing some of a role here, this clustering mirrors that seen for comparable items at Area B and again is not suggestive of the use of these items as toys (Ellis 1994a). Similarly, and although in a disturbed context, two gravers from the southern excavation block were also recovered in close association. This same pattern (e.g. the occurrence of such tools in multiples) was suggested in Area C.

CHAPTER 11

OTHER SITE AREAS

Introduction

All of the remaining site areas are known almost solely through surface investigation. Therefore, for the most part, the artifact assemblages from each are small. Moreover, with the odd exception, the eastern loci at the site in particular have not been extensively surface-collected on the assumption these would be more thoroughly investigated in the future. In fact, these areas were last examined in 1978. The lack of attention to these areas accounts for the low artifact yield. Excepting channel flakes, no flaking debris was collected from the unexcavated site areas but it is notable that the surface Collingwood flaking debris is uniformly small and clearly indicates a lack of primary manufacturing activities. The flaking debris noted on the surface, along with collected tools, preforms and channel flakes, was used to derive estimates of the areal extent of these areas. However, given the small artifact yield the estimates provided here must be regarded only as "ballpark" figures.

Area A/J

This area is the southernmost of those nearer the inferred Algonquin/Ardtrea strandline. It is located on the south side of a slight east to west trending ridge (Figure 1.3). At the time of the extensive field investigations, Area A was bordered on the west by an uncultivated farm lane adjacent to and paralleling the main north-south base-line. Area J referred to a small scatter of surface materials separated from Area A by the same lane. Subsequent to the excavations, this lane was removed and cultivated and material was recovered in the intervening lane suggesting it is simply an extension of Area A. Four test squares were excavated in Area A in 1973. All contained Paleo-Indian flaking debris. Combined with the surface finds, the area as a whole appears to be relatively linear in shape and to cover ca. 3250 sq. ft. (Table 1.1).

The fourteen artifacts include predominantly fluted bifaces (64.3%) and most of these (88.9%) are finished points (Table 11.1). The finished points include: four snapped basal sections, a tip end and three relatively complete points. Of the latter, two have broken ears. The third is the item which had a base snapped off, after which the knapper attempted to narrow and rework the base for rehafting (Figure 5.6f). As noted earlier, and as will be discussed later, the point sample from Area A/J seems to have larger (e.g. wider) waists than those in other areas. Also, the sample includes a high percentage on the rarer cherts: Onondaga and Bayport (5 of 8 or 62.5%). The sole fluted preform recovered is the unifacially fluted base made on a thin flake which only had unifacial preparation prior to fluting (Figure 5.11h). In fact, it is notable that two of the finished fluted points with plano-convex cross-sections suggestive of manufacture on a thin flake, are also from this area.

Besides an unfluted preform, other artifacts from the area include a denticulate, a piercer/graver and a retouched flake. The piercer is made on a channel flake while the retouched flake is on an end biface thinning flake. The surface collections include six

Table 11.1: Tool/Preform Totals, Area A/J.

TYPE/CLASS	COLLINGWOOD	ONONDAGA	BAYPORT	TOTAL
Fluted points	3	2	3	8
Fluted preforms	1	-	-	1
Unfluted preforms	1	-	-	1
Piercers or gravers	1	-	-	1
Denticulates	1	-	-	1
Retouched flakes	1	-	-	1
Other unifaces/ fragments	1	-	-	1
Totals	9 [64.3%]	2 [14.3%]	3 [21.4%]	14

Table 11.2: Tool/Preform Totals, Area E.

TYPE/CLASS	COLLINGWOOD	ONONDAGA	BAYPORT	TOTAL
Fluted points	3	-	-	3
Fluted preforms	1	-	-	1
Trianguloid end scrapers	1	-	-	1
Narrow end scrapers	1	-	-	1
Piercers or gravers	2	-	-	2
Notch/borer/ denticulate	-	1	-	1
Totals	8 [88.9%]	1 [11.1%]	-	9

channel flakes not including the item made into a tool. One is on Bayport chert while the rest are on Collingwood chert.

Area E

This cluster is located between two ridges adjacent to Areas B and C (Figure 1.3; Table 11.2). Surface finds suggest it is roughly linear and extends at least to the old lane on the west (0E) and is comparable to Area A/J in spatial extent (ca. 3,250 sq. ft.). Three test squares were excavated and all yielded Paleo-Indian materials including a graver.

Table 11.3: Tool/Preform Totals, Area G.

TYPE/CLASS	COLLINGWOOD	ONONDAGA	BAYPORT	TOTAL
Narrow end scrapers	1	-	-	1
Notch/borer/ denticulate	1	-	-	1
Concave side scrapers with spurs	1	-	-	1
Other side scrapers	2	-	-	2
Other unifaces/ fragments	1	-	1	2
Totals	6 [85.7%]	-	1 [14.3%]	7

Table 11.4: Tool/Preform Totals, Area H.*

TYPE/CLASS	COLLINGWOOD	ONONDAGA	BAYPORT	TOTAL
Trianguloid End Scrapers	2	-	-	2
Large Parallel-Sided End Scrapers	-	-	1	1
Offset End Scrapers	-(1)	-	-	-(1)
Hafted Perforator	1	-	-	1
Concave Side Scrapers with Spurs	1	-	-	1
Other Unifaces/ Fragments	2	-	-	2
Totals	6(7) [85.7%]	-	1 [14.3%]	7(7)

*totals in rounded brackets include recycled items in original and recycled forms.

Fluted bifaces, all of which are on Collingwood chert, are again the most common artifact form among the nine artifacts recovered (44.4%). Finished points include one tip-impacted item and two tips, one of which is missing only a small portion of the base. The single fluted preform is a small tip segment removed by an outre-passé flute termination. This last item indicates point manufacture occurred in the area despite a lack of channel flakes in the available collections.

Amongst the four unifaces present is the piercer with five spurs which was described earlier as a serially used "double-scribe" graver. The single narrow end scraper appears to be one made by recycling, perhaps on a side scraper.

Area G

This locality is situated about 250 ft. due east of Area E (Figure 1.3). It has not been the subject of intense surface collection and for this reason has only a small sample. Four test squares were excavated in the vicinity in 1975. These were devoid of Paleo-Indian materials. Subsequent research suggests these test squares were placed in error (due at least partly to the difficulties of surveying in 6 ft. high corn) just to the southwest of the actual concentration. The small artifact yield (Table 11.3) makes it difficult to accurately estimate the area's size. Current evidence suggests it is relatively small for the easternmost areas at the site, covering ca. 3,250 sq. ft. With the exception of a single unifacial tool fragment on Bayport chert, all the items recovered are on Collingwood chert. The two side scrapers include a single straight form and a large double convex form which subsequently had an inverse concave edge retouched into one margin (Figure 6.18a).

Area H

Area H is located along the southwestern edge of a shallow depression, some 100 feet east of Area G (Figure 1.3) and like that area, has not been thoroughly investigated. Of all the site areas this location is the most difficult to estimate its size. The greater uncertainty is due to the fact the material occurs on two adjacent farms and only the area on one of them (the western portion) has been examined on several occasions. The western portion covers only about 2500 sq ft. However, material does appear to be widespread on the adjacent farm and if this area is included this site area seems to be quite large, and would certainly cover over 10,000 sq. ft. as a whole. As at Area G, all of the tools recovered are unifacial forms and channel flakes are lacking. One tool placed in the other uniface category on Table 11.4 was originally an offset end scraper but subsequently, a thick flat working edge was flaked at the proximal tool end. A single large parallel-sided end scraper from this area on Bayport chert is the only non-Collingwood chert artifact. It is also the only complete item of this type recovered from the site (Figure 6.20a).

Area I

This locality is about 225 ft. north of Area D on the opposite side of the small east to west trending gully (Figure 1.3). It covers about 8500 sq. ft. The small number of tools from the area (Table 11.5) includes one relatively complete point on Bayport chert which has a remnant of a repaired tip impact fracture (Figure 5.1a). There is also a relatively complete backed biface from this locus. As discussed elsewhere (Deller and Ellis 1996:34-36), the recovery of backed bifaces in association with areas yielding fluted biface samples with high percentages of

Table 11.5: Tool/Preform Totals, Area I.*

Type/Class	Collingwood	Onondaga	Bayport	Total
Fluted Points	-	-	1	1
Backed Bifaces	1	-	-	1
Trianguloid End Scrapers	1	-(1)	-	1(2)
Bi-Bitted End Scraper	-	1	-	1
Piercers or Gravers	1	-	-	1
Other Side Scrapers	-(1)	-	-	-(1)
Retouched Flakes	1	-	-	1
Totals	4(5) [66.7%]	1(2) [16.7%]	1 [16.7%]	6(8)

*totals in rounded brackets include recycled items in original and recycled forms.

complete fluted points and/or point fore-sections is reported at several sites/site areas. This association suggests a possible functional relationship between the two types as in perhaps, butchering activities where such fluted bifaces would be recovered.

The single piercer or graver is the specimen made by recycling a double alternate side scraper (Figure 6.22a). The trianguloid end scraper, on Onondaga chert, has been recycled -- in this case into a bi-bitted form (Figure 6.10e). One used channel flake and one unused specimen were also found.

Area K

The final site area is situated about 100 ft. south of Area G on the north slope of an east-west trending ridge (Figure 1.3). It covers about 3,250 sq. ft. The artifactual material (Table 11.6) includes a single point, complete except for a broken ear. The marginally retouched biface is the specimen resembling a "Mungai knife" (Figure 5.17c). The "other" end scraper class includes a snapped bit with spur. Two of the unifacial forms are recycled items. One is a large piercer or graver made on the proximal end of a trianguloid end scraper (Figure 6.10a). The other is the concave side scraper with spur recycled into a narrow end scraper (Figure 6.19b). Channel flakes are not reported from this area.

Table 11.6: Tool/Preform Totals, Area K.*

TYPE/CLASS	COLLINGWOOD	ONONDAGA	BAYPORT	TOTAL
Fluted points	1	-	-	1
Marginally retouched bifaces	1	-	-	1
Trianguloid end scrapers	-(1)	-	-	-(1)
Fluted end scrapers	1	-	-	1
Narrow end scrapers	2	-	-	2
Offset end scrapers	1	-	-	1
Other end scrapers	1	-	-	1
Piercers or gravers	1	-	-	1
Notch/borer/ denticulates	1	-	-	1
Concave side scrapers with spurs	-(1)	-	-	-(1)
Retouched flakes	1	-	-	1
Totals	10(12) [100%]	-	-	10(12)

*totals in rounded brackets include recycled items in original and recycled forms.

CHAPTER 12

SITE LAYOUT AND INTER-SITE COMPARISONS

Introduction

The preceding chapters have summarized the various site areas and the characteristics of the recovered assemblages in each of those areas. In this chapter comparative studies are undertaken. First, the internal Parkhill site layout is examined and the various areas compared. Second, this layout, and other aspects of the site assemblage, are compared to other reported sites in the Northeast.

Site Layout

The Parkhill consists of at least nine discrete concentrations of lithic debris distributed over an area of some 6 ha. As such, the site represents a familiar pattern seen at a number of other reported Early Paleo-Indian sites in the Great Lakes-Northeast investigated over the past 50 years such as: Bull Brook, Massachusetts (Byers 1954; Grimes 1979); Debert, Nova Scotia (MacDonald 1968); Fisher, Ontario (Storck 1997); Gainey, Michigan (Simons 1997; Simons et al. 1984); Nobles Pond, Ohio (Gramly and Summers 1986; Seeman 1994); Shoop, Pennsylvania (Cox 1986; Witthoft 1952); Vail, Maine (Gramly 1982); and Williamson, Virginia (McCary 1951). As is the case with some or all of the areas at these sites, certain areas at Parkhill are not that well known, being simply small surface-collected assemblages. We have always been cautious in our assessments being well aware of sample size problems but we have discussed some potential patterns in the layout of the site in print (Deller and Ellis 1992a: 27-31; Ellis 1993:594-596) believing one has to start somewhere and do the best one can with available data. We have stressed particularly the idea that the frequency of fluted bifaces varies significantly between the site areas and that such frequency co-varies with spatial placement at the site. Nonetheless, our interpretations have come under criticism particularly because of the small sample sizes (Storck 1997:264-265). We continue to believe there are certain patterns at Parkhill which are not a product of sample size and pay particular attention to demonstrating these patterns in the following discussions.

Table 12.1 lists the tool/preform totals for each area. As previous discussions have indicated, only three of the nine site areas have been intensively investigated and thus, have relatively large artifact assemblages: Areas B, C and D. These areas will be considered first, prior to examining the other site locations.

It is quite clear that Area B represents a very specialized activity area or, in Wilmsen's (1970) terms, a "limited activity location." As indicated in previous chapters, the percentage of fluted bifaces from the area is very high (68.6%) and few other kinds of items were recovered. In fact, where the data have been presented to allow exact frequency calculations the percentage of fluted bifaces actually *exceeds that known for all other Early Paleo-Indian sites/site areas reported to date in the Great Lakes area* (N=53), often by a wide margin. For example, this percentage is almost twice that seen at even the Fisher site area with the highest percentage of fluted bifaces (Area K; 37.5%) regardless of sample sizes and at least two to three times that in percentages of every other

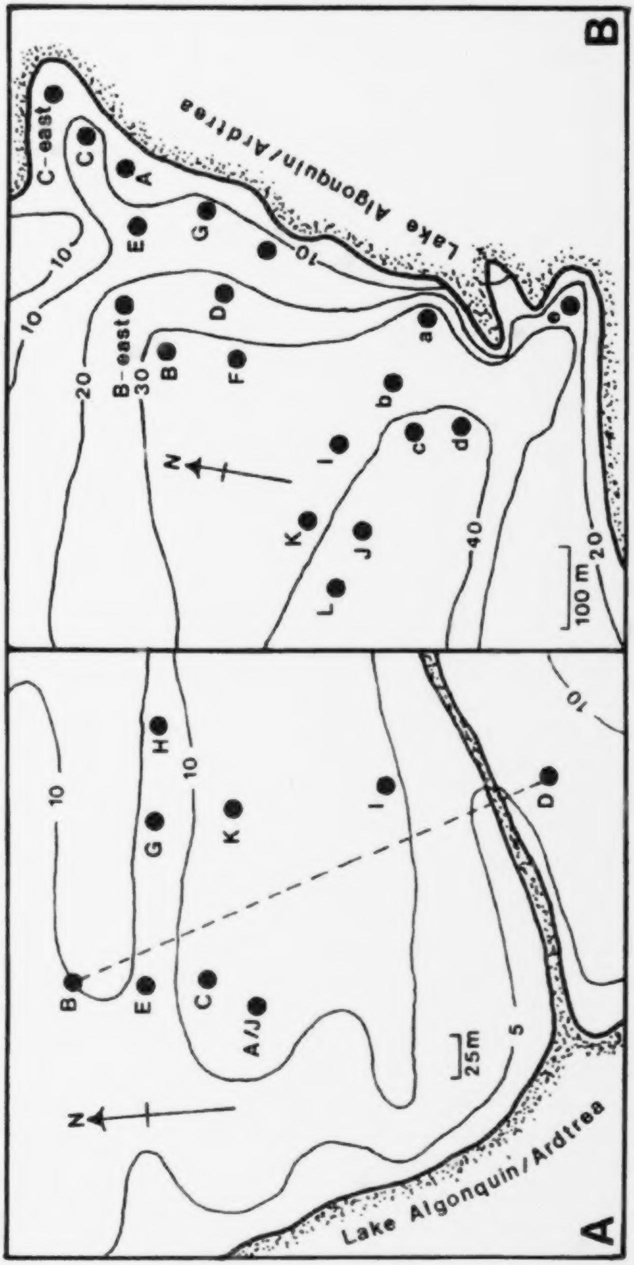

Figure 12.1: Site layouts in relation to Lake Algonquin/Ardtrea, Parkhill (A) and Fisher (B) sites. Elevations are in feet above arbitrary datum points.

reported locale outside of several other areas at Parkhill itself (Table 12.2). Moreover, as we have noted above, although only part of the area was excavated, the high percentage of fluted bifaces characterizes the surface collected material outside the excavated area (4 of 6 or 66.6%; one of the remaining items is an unfluted preform) and all peripheral test units. In addition to the fluted biface frequency, the large number of channel flakes from Area B is consistent with the emphasis on fluted biface-related activities. In fact, as shown on Table 12.3, one can also order the three main excavated areas at Parkhill in terms of biface percentages and this ordering is matched by that produced based on overall percentage of biface debris. Area B has the highest percentage in both cases. Also, the relatively high debris to tool ratio at Area B of >20 to 1, although not the highest at Parkhill for reasons discussed in Chapter 9 (see Table 12.4), is also consistent with the emphasis on biface-related activities. The finishing of such items produces much more debris than uniface resharpening and retouching. A pattern of high debris to tool ratios associated with sites with large percentages of bifaces is clear (e.g. Table 8.4) and has been discussed and explored in detail elsewhere (Deller and Ellis 1992b:89; Muller 1999). By weight, the debris to tool ratio at Area B is higher than that at Areas C and D (Table 12.5) and this result is perfectly in line with the fact more debris is produced in biface production and the higher percentage of bifaces at Area B. Overall, in terms of lithic-related activities, other than those tasks involving bifaces and particularly fluted ones, few other tasks seem to have been undertaken.

For the most part, the tools and debris at Area B are dominated by Collingwood chert items (Tables 8.2 and 12.6). The fluted biface assemblage consists mainly of finished points (58 of 66 or 87.9% (Table 5.4) and particularly, basal sections (48 of 58 or 82.8% are ears or bases; Table 5.1). This predominance indicates point-hafting and presumably, post-hunting activities were important. Nonetheless, the relatively high percentage of biface debris and of specific debris forms such as channel flakes and overall, a high debris to tool ratio, indicate point production in anticipation of future use was also a major activity. The fact two channel flakes from Area B fit onto two point fragments from Area D indicate at least some of the points produced at B were also used during the occupation or shortly thereafter.

In contrast to Area B, and even though Collingwood chert items still markedly predominate, Bayport and Onondaga items are more common at Area C (Table 12.6). Further, the percentage of fluted bifaces at Area C is somewhat lower than that at Area B (Table 12.2). Again, and as at Area B, only a fraction of Area C was excavated but as noted earlier the artifacts from surface collections outside the main excavated area are almost identical to that among the items from the main excavation block in frequency and kind. This evidence indicates the excavated sample from C is representative of the area as a whole. The remainder of the Area C tool assemblage is distributed relatively evenly between a number of unifacial classes with only the rather amorphous unifacial tool fragments being common but it is worth noting that the number of types/general tool classes at C is identical to that at B (15 of 27 or 55.6%).

Regardless of the somewhat lower percentage of fluted bifaces versus Area B, the frequency of Area C fluted bifaces is still larger than that reported for almost all Great Lakes Paleo-Indian sites. Indeed, only Areas A/J and B at Parkhill have higher percentages and the 45.6% fluted bifaces at Area C is nearly double that of almost every other reported fluted point location (Table 12.2). The percentage of fluted bifaces at Area C is certainly comparable to those in Judge's (1973) relatively specialized, fluted preform dominated, "armament areas" on Folsom sites in New Mexico even though the Parkhill Area C assemblage consists of largely finished points (20 of 23 points or preforms or 87%; Table 5.4). Again, the conclusion must be that Area C is a limited activity location where, since point bases predominate (17 of 20 finished points or 85%), point rehafting was a major activity. However, the high debris to tool ratio, and the relatively large percentage of biface debris suggests point manufacture, as well as probably the manufacture of other biface tool forms such as large alternately bevelled bifaces (see Chapter 9), were also important.

At Area D, Collingwood chert was used almost exclusively in tool use and production activities (Tables 10.3, 12.6). In contrast to

Table 12.1: Distribution of Artifact Types by Site Areas.*

Type/Class	A/J	B	C	D	E	G	H	I	K	Other	Total
Points	8	58	20	13	3	-	-	1	1	2	106
Preforms	1	8	3	2	1	-	-	-	-	-	15
Other fluted bifaces	-	4(5)	3	4	-	-	-	-	-	-	11(12)
Unfluted preforms	1	2	-	2	-	-	-	-	-	-	5
Channel flake points	-	4	-	2	-	-	-	-	-	-	6
Large alternately bevelled bifaces	-	-	2	1	-	-	-	-	-	-	3
Small alternately bevelled bifaces	-	1	-	1	-	-	-	-	-	-	2
Backed bifaces	-	-	-	1	-	-	-	1	-	-	2
Marginally retouched bifaces	-	2	-	-	-	-	-	-	1	-	3
Biface fragments	-	2	1	1	-	-	-	-	-	-	4
Trianguloid End scrapers	-	-	3(5)	15(20)	1	-	2	1(2)	-(1)	-	22(31)
Large parallel-Sided end scrapers	-	1	1(2)	5(6)	-	-	1	-	-	-	8(10)
Laterally notched end scrapers	-	-	-	3	-	-	-	-	-	-	3
Fluted end scrapers	-	-	1	-	-	-	-	-	1	-	2
Bi-bitted end scrapers	-	-	-	2	-	-	-	1	-	-	3
Narrow end scrapers	-	-	2	3	1	1	-	-	2	-	9
Offset end scrapers	-	-	-	1	-	-	- (1)	-	1	-	2(3)

Table 12.1: Continued.

Type/Class	A/J	B	C	D	E	G	H	I	K	Other	Total
Other end scrapers	-	-	-	4	-	-	-	-	1	-	5
Simple beak	-	1	1	2	-	-	-	-	-	-	4
Hafted perforator	-	1	-	-	-	-	1	-	-	-	2
Piercers or gravers	1	1	4	6	2	-	-	1	1	-	16
Denticulate	1	-	-	2	-	-	-	-	-	1	4
Notch/ Borer/ Denticulate	-	-	-	3	1	1	-	-	1	-	6
Concave side scrapers with spurs	-	-	1	-	-	1	1	-	-(1)	-	3(4)
Other side scrapers	-	2	3	6	-	2	-	-(1)	-	-	13(14)
Retouched flakes	1	12	2	3	-	-	-	1	1	-	20
Other unifaces & fragments	1	3	10	33	-	2	2	-	-	-	51
Totals	14	102 (103)	57 (60)	115 (121)	9	7	7 (8)	6 (8)	10 (12)	3	330 (345)

*numbers in brackets indicate totals counting recycled items in both their original and recycled forms.

Areas B and C, activities seem to have been much less specialized and this area can be regarded as a "multiple activity location" in Wilmsen's (1970) terms. Although fluted bifaces make up the single largest class at Area D (16.5%), the percentage of these artifacts in the sample is much less than that in Areas B and C and is much closer to the frequencies reported for several other northeastern sites (Table 12.2). Moreover, the percentage of trianguloid end scrapers at Area D (13.0%) is close to that of the fluted bifaces and would actually be better represented than the fluted bifaces if recycled items were included (17.4% as compared to 16.5%), and moreso if we also included the differently hafted but probably functionally equivalent laterally notched end scrapers in with the trianguloid end scraper sample (20% versus 16.5%). In short, fluted bifaces are not the only item occurring in significant quantities at the area. There are also suggestions that the fluted biface percentages at Area D are biased due to sampling error. For example, virtually all of these items from excavated contexts

Table 12.2: Fluted Biface Percentages, Paleo-Indian Sites.[1]

Site or Site Area	Sample Size	% of Fluted Bifaces	Reference
Parkhill Area B	102	68.6%	this volume
Parkhill Area A/J	14	64.3%	this volume
Parkhill Area C	57	45.6%	this volume
Barnes	45	44.4%	Voss 1977; Wright and Roosa 1966
Parkhill Area E	9	44.4%	this volume
Fisher Area K	8	37.5%	Storck 1997: Table 2.2
Bolton	24	33.3%	this volume[3]
Thedford II A-West	34	26.5%	Deller and Ellis 1992b
Fisher Area C-East	102	25.5%	Storck 1997: Table 2.7
Fisher Area d	8	25.0%	Storck 1997: Table 2.2
F. Wight	4	25.0%	Deller and Ellis 1992a:31
Fisher Area D	167	24.6%	Storck 1997: Table 2.8
Alder Creek	10	20.0%	Timmins 1994: Table 1
Parkhill Area I	6	16.7%	this volume
Thedford II B	6	16.7%	Deller and Ellis 1992b
Parkhill Area D	115	16.5%	this volume
Fisher Area E	25	16.0%	Storck 1997: Table 2.2
Fisher Area B	439	14.9%	Storck 1997: Table 2.5
Thedford II A-Northeast [2]	29	13.8%	Deller and Ellis 1992b
Dixon	15	13.3%	Deller and Ellis 1992a:31
Gainey	951	11.2%	Shott 1997: Table 1
Leavitt	75	10.7%	Shott 1993
Arc Area D	49	10.2%	Shott 1997: Table 1
Parkhill Area K	10	10.0%	this volume
Arc Area C	238	9.7%	Shott 1997: Table 1

Table 12.2: Continued.

Site or Site Area	Sample Size	% of Fluted Bifaces	Reference
Thedford II A-East	26	7.7%	Deller and Ellis 1992b
Snary	13	7.7%	Wortner and Ellis 1993
Fisher Area c	28	7.1%	Storck 1997: Table 2.11
Eamon Pond	72	6.9%	Tankersley 1995
Fisher Area b	120	6.7%	Storck 1997: Table 2.10
Arc Area A	44	4.6%	Shott 1997: Table 1
Crowfield Unheated	26	3.8%	Deller and Ellis 1984: Table 3
Arc Area B	378	2.7%	Shott 1997: Table 1
Fisher Area F	180	1.7%	Storck 1997: Table 2.9
Thedford II A-Centre	67	1.5%	Deller and Ellis 1992b
Halstead	80[4]	1.3%	Jackson 1994: Table 22
Potts Locus B	221	0.9%	Gramly and Lothrop 1984:Table 3
Fisher Area C	274	0.8%	Storck 1997: Table 2.6
Potts Locus A	193	0.0%	Gramly and Lothrop 1984:Table 3
Culloden Acres Area A	65	0.0%	Ellis and Deller 1991
Sandy Ridge	61	0.0%	Jackson 1994: Table 22
Fisher Area A	18	0.0%	Storck 1997: Table 2.2
McLeod A	18	0.0%	Deller and Ellis 1992a: Table 5
Murphy Area A	16	0.0%	Jackson 1996:20-26
Fisher Area L	15	0.0%	Storck 1997: Table 2.2
Fisher Area B-East	12	0.0%	Storck 1997: Table 2.2
Fisher Area a	11	0.0%	Storck 1997: Table 2.2
Fisher Area I	11	0.0%	Storck 1997: Table 2.2

Table 12.2: Continued.

Site or Site Area	Sample Size	% of Fluted Bifaces	Reference
Fisher Area a	11	0.0%	Storck 1997: Table 2.2
Fisher Area I	11	0.0%	Storck 1997: Table 2.2
McLeod C	9	0.0%	Deller and Ellis 1992a: Table 5
Thedford II A-Southeast	9	0.0%	Deller and Ellis 1992b
Parkhill Area G	7	0.0%	this volume
Parkhill Area H	6	0.0%	this volume
McLeod B	5	0.0%	Deller and Ellis 1992a: Table 5

[1]: totals include tool fragments but exclude cores. Bipolar pieces are considered tools. Table is limited to sites with 4 or more tools/preforms.

[2]: total excludes cache of 13 fluted bifaces.

[3]: corrected from error in Deller and Ellis 1996: Table 35 (N=24 not N=31).

[4]: excludes channel flakes from artifact totals presented by Jackson (1994).

came from the southern excavation block at Area D (Figure 10.1). Based on the other excavated areas at Area D and the surface collections as discussed earlier, fluted bifaces may be rarer than the above totals indicate although the figures are comparable in all collections suggesting the overall sample from Area D is representative.

Nevertheless, a greater diversity of tool forms is present at Area D (23 of 27 or 85.6% of the recognized tool types/classes) as opposed to Areas B and C. Area D also is the only area of the three where the combined percentage of fluted bifaces and trianguloid end scrapers is less than the percentage of all other items. Such data suggest a greater diversity of tasks were performed. The greater emphasis on activities associated with unifacial tools in comparison to Areas B and C is also suggested by a much lower debris to tool ratio (Tables 12.4 and 12.5) and relatively less biface debris (Table 12.3). In fact, as Muller (1999) has argued in great detail, the close correlation of variation between the flaking debris assemblages and the tool assemblages at these Parkhill areas (and virtually all other sites) clearly suggests to us that sampling problems are not as major a source of inter-assemblage variability in the tool/preform categories as some have suggested (Shott 1997). In our view, activity variation is a major source of that variation.

Therefore, the tool/preform assemblages suggest Area B and C are highly specialized activity locations where during the occupation, point manufacture, hafting and one presumes, use, were important. Area D however, includes a more diverse assemblage being much more dominated by unifacial tools and especially tools

Table 12.3: Percentage of Biface Tools/Preforms and Biface Debris.*

Area	Biface Percentage Overall	Biface Percentage in Excavated Area	Biface Debris %
B	79.4% (81/102)	78.1% (75/96)	98.1% (1237/1261)
C	50.9% (29/57)	51.1% (23/45)	82.2% (522/635)
D	23.5% (27/115)	25.0% (14/56)	76.1% (255/335)

* includes only flaking debris which would be recovered in 1/4" mesh. Biface debris percentage calculated as a percentage of total biface and uniface debris.

Table 12.4: Debris to Tool Ratios by Frequency, Parkhill Areas B, C and D.*

Area	Collingwood	Onondaga	Bayport	Unknown	Total
B	21.5 to 1 (1851 to 86)	8.5 to 1 (34 to 4)	10 to 1 (50 to 5)	8 to 1 (8 to 1)	20.2 to 1 (1943 to 96)
C	17.2 to 1 (550 to 32)	43.1 to 1 (302 to 7)	34.2 to 1 (171 to 5)	27 to 1 (27 to 1)	23.3 to 1 (1050 to 45)
D	9.2 to 1 (494 to 54)	8 to 1 (8 to 1)	N/A (3 to 0)	2 to 1 (2 to 1)	9.1 to 1 (507 to 56)

* includes only items from the excavated areas which would be recovered in 1/4" mesh.

Table 12.5: Debris to Tool Ratios by Weight, Parkhill Areas B, C and D.*

Area	Collingwood	Onondaga	Bayport	Unknown	Total
B	2.4 to 1 (279.30 to 114.42)	0.5 to 1 (4.87 to 10.73)	1.0 to 1 (10.57 to 10.94)	1.7 to 1 (1.65 to 0.95)	2.2 to 1 (196.39 to 137.04)
C	0.9 to 1 (86.85 to 98.09)	2.0 to 1 (70.48 to 35.26)	1.5 to 1 (29.28 to 20.26)	0.8 to 1 (7.10 to 9.19)	1.2 to 1 (193.71 to 162.80)
D	0.6 to 1 (104.27 to 166.07)	0.3 to 1 (1.39 to 4.57)	N/A 0.57 to 0.0	0.2 to 1 (0.29 to 1.31)	0.6 to 1 (106.52 to 171.95)

* includes only items from the excavated areas which would be recovered in 1/4" mesh. Numbers in brackets are actual weight in grams. N/A: not applicable.

such as trianguloid end scrapers. If we examine the spatial distribution of the areas (Figures 1.3 and 12.1a), it is notable that the two areas biased towards point production and use are in relatively close juxtaposition at the western/northwestern margin of the site almost on the inferred Lake Algonquin/Ardtrea strandline (e.g. closer to the 605' a.s.l. contour). As indicated previously, at least two other discrete artifact concentrations also occur in that location: Areas A/J and E and as a whole, we will refer to these four areas as the "strandline areas" in the following.

The sample sizes from Areas A/J and E are small. However, both these latter areas seem comparable to the more intensively examined strandline loci; that is, the surface collections are dominated by fluted bifaces in frequencies over 40% (Table 12.2) and no other tool form seems common (Table 12.1). These data suggest these two areas are also limited activity locations. In order to evaluate this idea further, a regression comparing fluted biface frequency and sample size (including tool fragments) was undertaken for the 53 sites or site areas where good data are available. The regression of these two variables (Figure 12.2) does show that in general the larger an assemblage, the more fluted bifaces are represented ($r=.768$; $p<.01$). What is notable however, is that a large number (17 of 53 or 32.1%) of the assemblages fall outside the 99% confidence limits of the mean of the regression line as is to be expected given a relatively low r^2 value of 0.590. In sum, there are a large number of sites (labelled with keys on Figure 12.2) which stand out as unusual in that they either have a much larger or smaller number of fluted bifaces than expected. Not surprisingly, Parkhill Areas B and C, as well as the Barnes site, appear as outliers with a higher percentage than expected. Also having above average expected frequencies of fluted bifaces are Fisher site Areas B, C-East and D and this result is exactly in line with the conclusions of Stewart (1997:181-182) that those Fisher site areas emphasized fluted biface related activities (among other things) although as we will discuss below, the Fisher samples contrast with Parkhill in that they are mainly fluted preform rather finished point samples. At the opposite extreme there are sites where fluted bifaces seem under-represented such as Fisher Areas C and F and again, this evidence is in line with the conclusions of Stewart (1997:182).

Turning to the Parkhill areas, Area D actually also has a high percentage of fluted bifaces, falling as it does outside the 99% confidence limits but as previously noted it differs from the other areas in that there are larger percentages of other tools and especially of trianguloid end scrapers. Unfortunately, variation in the published record involving the recognition and reporting of end scrapers makes inter-site comparisons difficult. Nonetheless, complete enough data are reported for 28 sites or site areas where trianguloid end scrapers are recognized as a distinctive type or the end scraper assemblages are reported in enough detail, to compare trianguloid end scraper frequencies (Figure 12.3). Again, there is a significant relationship between trianguloid end scraper frequency and assemblage size ($r=0.588$; $p<.01$) but a low r^2 value of 0.346 and the fact ten locales or 43.5% of the sample fall outside the 99% confidence limits of the mean indicate there is much variation which has nothing to do with sample size. As expected, Parkhill Area B and C have a lower than expected number of trianguloid end scrapers in contrast to Area D where essentially the expected number occurs -- again conforming to expectations that Area D is less specialized.

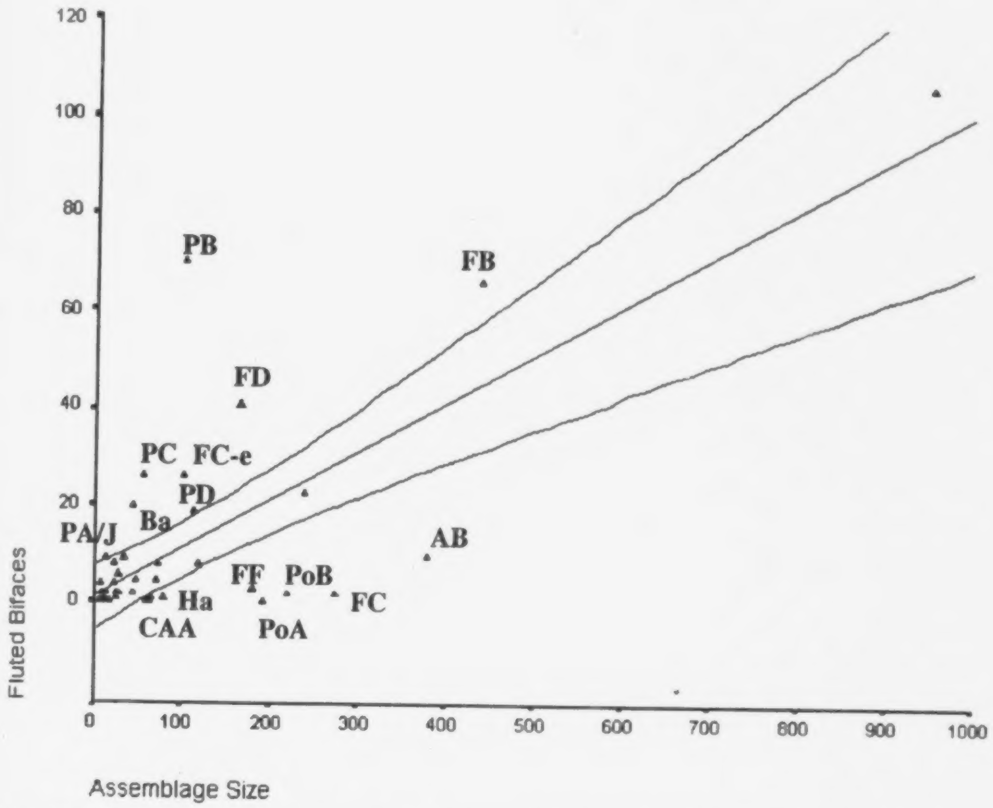

Figure 12.2: Relationship between fluted biface frequency and assemblage size, Great Lakes Paleo-Indian sites. 99% confidence limits of mean are plotted. Only outliers are identified. Ba: Barnes; CAA: Culloden Acres Area A; FB: Fisher Area B; FC: Fisher Area C; FC-e: Fisher Area C-East; FF: Fisher Area F; Ha: Halstead; PA/J: Parkhill Area A/J; PB: Parkhill Area B; PC: Parkhill Area C; PD: Parkhill Area D; PoA: Potts Area A; PoB: Potts Area B.

Area D remains within the 99% confidence limit range of predicted frequencies even if one does a regression including the laterally notched end scrapers or even the subsequently recycled trianguloid forms in the sample. There are also a number of sites/site areas which have a large number of these trianguloid end scrapers and fall outside the 99% confidence limits. Notably these sites include ones which have been previously argued to be relatively specialized areas devoted largely to the use of these scrapers such as Sandy Ridge (Jackson 1994, 1998), Snary (Wortner and Ellis 1993), Culloden Acres Area A (Ellis and Deller 1991) and Dixon (Deller and Ellis 1992a:31). Indeed, in our experience most of the inter-assemblage variability in tool inventories on Ontario sites (e.g. extreme variation in frequencies), and especially at small sites, is driven by differences in the representation of

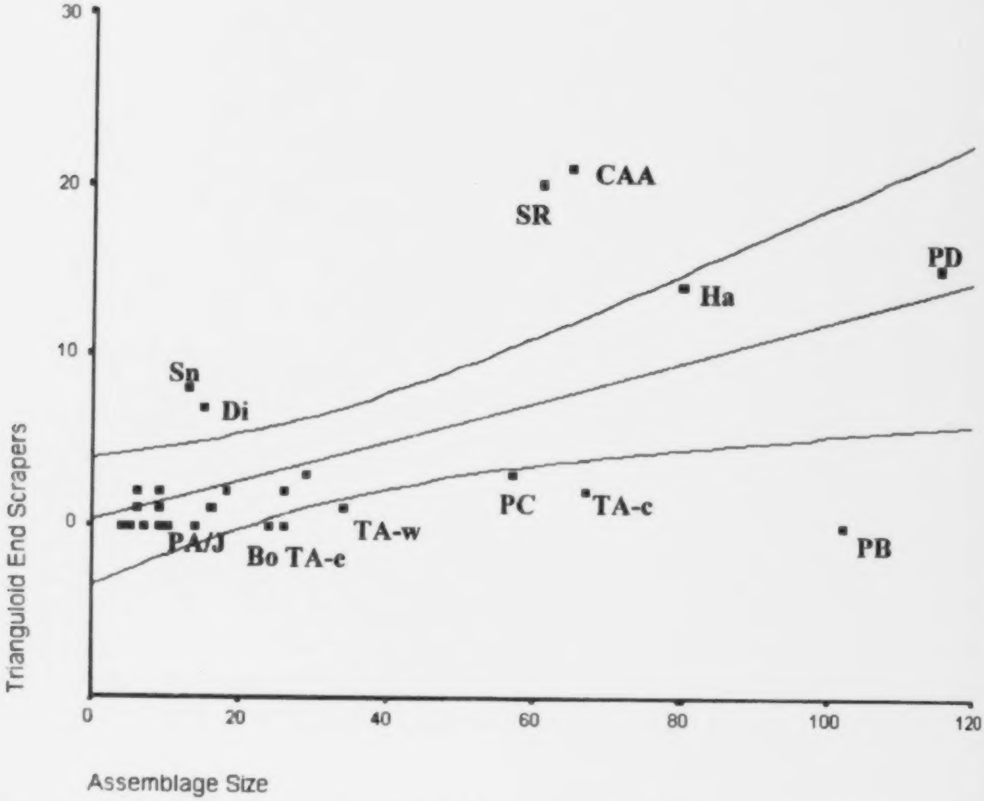

Figure 12.3: Relationship between trianguloid end scraper frequency and assemblage size, Great Lakes Paleo-Indian sites. 99% confidence limits of mean is plotted. Only sites/site areas of interest are identified. Bo: Bolton; CAA: Culloden Acres Area A; Di: Dixon; Ha: Halstead; PA/J: Parkhill Area A/J; PB: Parkhill Area B; PC: Parkhill Area C; PD: Parkhill Area D; SR: Sandy Ridge; Sn: Snary; TA-c: Thedford II Area A-Centre; TA-e: Thedford II Area A-East; TA-w: Thedford II Area A-West.

either or both of fluted bifaces and trianguloid end scrapers. The much more loosely defined piercers/gravers or retouched flakes are the only other types, or more properly classes, of items which seem to come close to the other two tool types in proportional frequency. Overall, it is not surprising therefore that certain sites stand out markedly as emphasizing either end scraper or fluted biface related activities but not both if one compares the frequency of the two items in relation to sample size (Figure 12.4). In contrast, other sites/areas which seem to have a wider range of activities, such as Parkhill Area D, emphasize both and/or other tool forms are more important (Figure 12.4) .

Even though Area A/J has yielded only 14 items, it also falls outside the 99% confidence limits of the mean regression best fit line for the fluted bifaces (Figure 12.2)

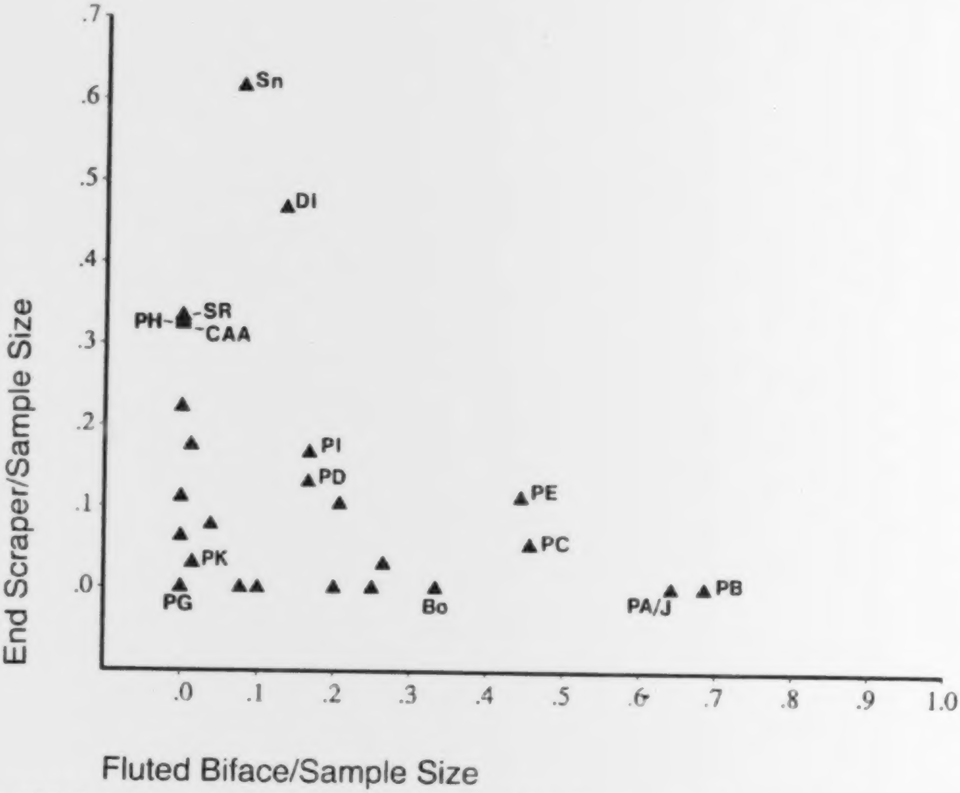

Figure 12.4: Comparison of sites by frequency of trianguloid end scrapers and fluted bifaces. Bo: Bolton; CAA: Culloden Acres Area A; Di: Dixon; PA/J: Parkhill Area A/J; PB: Parkhill Area B; PC: Parkhill Area C, PD: Parkhill Area D; PE: Parkhill Area E; PG: Parkhill Area G; PH: Parkhill Area H; PI: Parkhill Area I; PK: Parkhill Area K; SR: Sandy Ridge; Sn: Snary.

suggesting sampling error can not account for their high frequency. Area E does not fall outside even the 99% or even 95% confidence limits of the mean and therefore, we can not really rule out sample size as the source of that variation using this information. However, it is worth stressing, as reference to Table 12.2 shows, *all the strandline areas at Parkhill* including Area E have some of the largest percentages of fluted bifaces reported for all of the Great Lakes region. They include, along with the Barnes site, Michigan, the top five sites in terms of fluted biface percentages ever reported. Indeed, since the percentage of fluted bifaces at Area E actually matches that at Barnes, the four strandline areas at Parkhill have the highest percentages of fluted bifaces of any site or site area (Table 12.2). Despite the fact some of these areas have small artifact samples, it is stretching incredulity to argue that the high percentages of fluted bifaces is due to sampling error when all these areas come from one site out of all the numerous sites reported. Such a position is stretched to the point of breaking when we consider these areas with high percentages of fluted bifaces are not only from one site but in fact come from areas in close juxtaposition spatially within that site. In sum, the high percentages of fluted bifaces at Areas A/J and E are not a product of sampling unless a very large number of extremely unlikely coincidences are in operation. As at Parkhill Areas C and B, a consideration of the relationship of both trianguloid end scraper and fluted biface frequency reveals the distinctiveness of all these strandline areas from every other reported site or site area including Area D at Parkhill (Figure 12.4). The strandline areas stand out as completely different, and in the same ways, from every other reported central Great Lakes area site.

Table 12.6: Raw Material Distributions by Tools/Preforms, Parkhill.

Area	N	Collingwood	Onondaga	Bayport	Other
A/J	14	9(64.3%)	2(14.3%)	3(21.4%)	-
B	102	92(90.2%)	4(3.9%)	5(4.9%)	1(1.0%)
C	57	42(73.7%)	8(14.0%)	6(10.5%)	1(1.8%)
D	115	105(91.3%)	7(6.1%)	2(1.7%)	1(0.9%)
E	9	8(88.9%)	1(11.1%)	-	-
G	7	6(85.7%)	-	1(14.3%)	-
H	7	6(85.7%)	-	1(14.3%)	-
I	6	4(66.7%)	1(16.7%)	1(16.7%)	-
K	10	10(100%)	-	-	-

The fluted bifaces from Areas A/J and E are largely finished point fragments (88.9 and 75% respectively of point and preform totals; Table 5.4), and especially basal fragments or items with basal damage which could not be easily reworked. This evidence again suggests rehafting was important. At Area A/J, a single fluted preform and the recovery of several channel flake fragments also suggest point manufacture was important. At Area E, no channel flakes have been recovered but this may simply be a product of sampling. Certainly, one fluted preform was recovered from that area which indicates some point manufacture definitely occurred. In any case, both Areas A/J and E are similar to Areas B and C in that finished fluted point fragments rather than fluted preforms dominate the assemblage (>75% of fluted biface sample). In this regard, and as noted earlier in the Area B descriptions, these areas even stand out from the Barnes site in Michigan which is the only other reported locality with a very high percentage of fluted bifaces (e.g. over 40% of the total assemblage). At Barnes, most of the fluted bifaces are preforms with only ca. 25% being finished points or fragments thereof (Voss 1977; Wright and Roosa 1966).

In addition to their emphasis on fluted biface related activities and western site location, the four strandline areas exhibit other similarities and differ from other areas at the site. For example, all these areas are in relatively close juxtaposition to one another. Also, in comparison to at least some of the other site areas at Parkhill, all seem to have been relatively small spatially (Table 1.1). All indications therefore, are that the areas on the west edge of the site are relatively homogeneous in terms of several characteristics.

Turning to other site areas in the east portion of Parkhill which we will call the "interior" areas, only Area D has a substantial artifact sample due partially to the fact it was intensively surface-collected by Randy Laye, Gary Laye and Ray Baxter. As previously suggested, this area seems to represent a location of relatively diverse activities although even here fluted bifaces are somewhat common. It is notable once again, however, that despite the small samples sizes, all the other interior areas also seem to have quite diverse tool assemblages. Excluding the general tool classes, and excepting two trianguloid end scrapers from Area H and two narrow end scrapers from Area K, these other areas include largely tool types/classes with single representatives (Table 12.1). Moreover, and of course, these areas have little in the way of fluted bifaces and, excepting Area D, the fluted bifaces recovered (single examples from I and K) are complete ones and not the bases found at other areas. These could be indicative of butchering in which the items were retrieved or at least discarded rather than rehafting or manufacturing activities. For what it is worth, in surface collection prior to excavations only two of these five interior areas (Areas D and I) yielded channel flakes and/or point preforms as opposed to all four of the strandline areas. A consideration of both fluted biface and trianguloid end scraper frequency suggests that, excepting perhaps Area H at Parkhill, all the interior areas were much less specialized than most other sites with regard to the use of one or the other of these tool forms (Figure 12.4). Indeed, at all the interior areas the combined percentage of the fluted bifaces and trianguloid end scrapers is exceeded by other kinds of artifacts (66.7% to 100%) suggesting a greater diversity of activities. In contrast, at the strandline areas these other artifacts make up only 31.4% to 49.1% of the assemblage.

While we can not rule out that small sample sizes are accounting for the differences between the relatively poorly known surface-collected interior areas and the strandline ones, the fact a similar deemphasis on fluted biface related activities correlates with spatial location at the site leads us to strongly suspect more than simply sampling bias is at work here. Moreover, not only are these interior areas seemingly similar in their broader uniface dominated tool assemblages but they also exhibit other similarities which seem to distinguish them from the strandline areas. For one thing, they are not in close juxtaposition to one another but seem irregularly distributed. Second, the areas are all notable in that surface indications, including the distribution of unretrieved Collingwood chert flaking debris visible on the site surface, suggest that at least some interior areas are larger than any of the strandline site areas with the notable exception of Areas G and K (Table 1.1).

Therefore, one can argue that at least two kinds of areas occur at Parkhill: 1) specialized or limited activity locations dominated solely by fluted bifaces; and 2) areas of relatively more diverse activities or where the use/discard of more than one tool type or class was stressed. Multiple lines of evidence support this interpretation including: a) artifact type frequency variation (especially of fluted bifaces) within the site and in comparison to that seen at a large number of other well-documented sites/site areas; b) correlation of variation in the frequency of artifact types with spatial location at Parkhill; c) some degree of correlation of spatial location (and its attendant differences in artifact type frequency) and areal size; and d), correlations in the arrangement of the different areas in comparison to one another within the strandline/interior dichotomy. These lines of evidence combine to strongly suggest that this spatial dichotomy is not a product of sampling -- it is virtually impossible to explain such consistent differences between the strandline and interior areas in those terms and real substantive behavioural differences are clear.

As suggested during the Area B discussions in Chapter 8, given the high frequency of fluted bifaces in the strandline vicinity one could suggest these areas were occupied largely by males. This interpretation being correct, it is plausible to suggest that the interior areas may represent those locations in which the population as a whole or sub-groups thereof camped during the same occupations -- an interpretation consistent with a greater areal extent and one presumes population in some of the interior areas such as areas D, H and I. That the occupation in such areas may have occurred at the same time as some of the occupations in the strandline areas is demonstrated by the matching of channel flakes from Area B with fluted bifaces at Area D. It is also notable that in terms of raw material profiles (Table 12.6), Areas B and D seem similar, notably in that they have a high percentage of Collingwood and only traces of the other materials. They seem more similar than say, Areas C and D, as the former includes a very high percentage of items on materials such as Onondaga and Bayport not seen at Area D. For that matter, Area A/J also seems to have a different raw material profile especially given the number of fluted bifaces on Onondaga and Bayport compared to Area D (Table 12.6). One assumes the Collingwood chert at Parkhill was procured directly during a regular cycle of annual movements. However, the means by which the other materials entered the site assemblage probably differed. They could result from exchange of some kind. Just as likely, they may have been brought by individuals or small social units such as families who, independent of most people in local areas, shifted the areas they exploited from other areas of Ontario where Onondaga chert occurs, or from Michigan where Bayport material originates.

Regardless of the exact mechanism involved, the greater similarity in raw material profiles between Areas B and D reinforces the data from the channel flake-point cross-mends that these two areas are related and may represent one use of the site. In contrast, the increased reliance on different materials in other areas such as A/J may suggest occupations at other times – in short, that the site was occupied more than once (Deller 1988:161). We have suggested elsewhere (Deller and Ellis 1992b:45) that there may be changes over time in the size of Barnes points (such as from wider to narrower examples) and since these complex items seem to be more time-sensitive and occur in relatively large quantities, inter-area comparisons at Parkhill might reveal areas used at different times.

Boxplots of different point characteristics comparing the samples from different site areas are shown as Figures 12.5 to 12.13. For the most part, the results suggest these fluted biface assemblages are much the same. Notable in this regard are characteristics such as face-angle (Figure 12.5), flute width (Figure 12.6), and total flute surface (e.g. channel) width (Figure 12.7). Differences in some other characteristics between areas such as flute length (Figure 12.8) are suspect given the

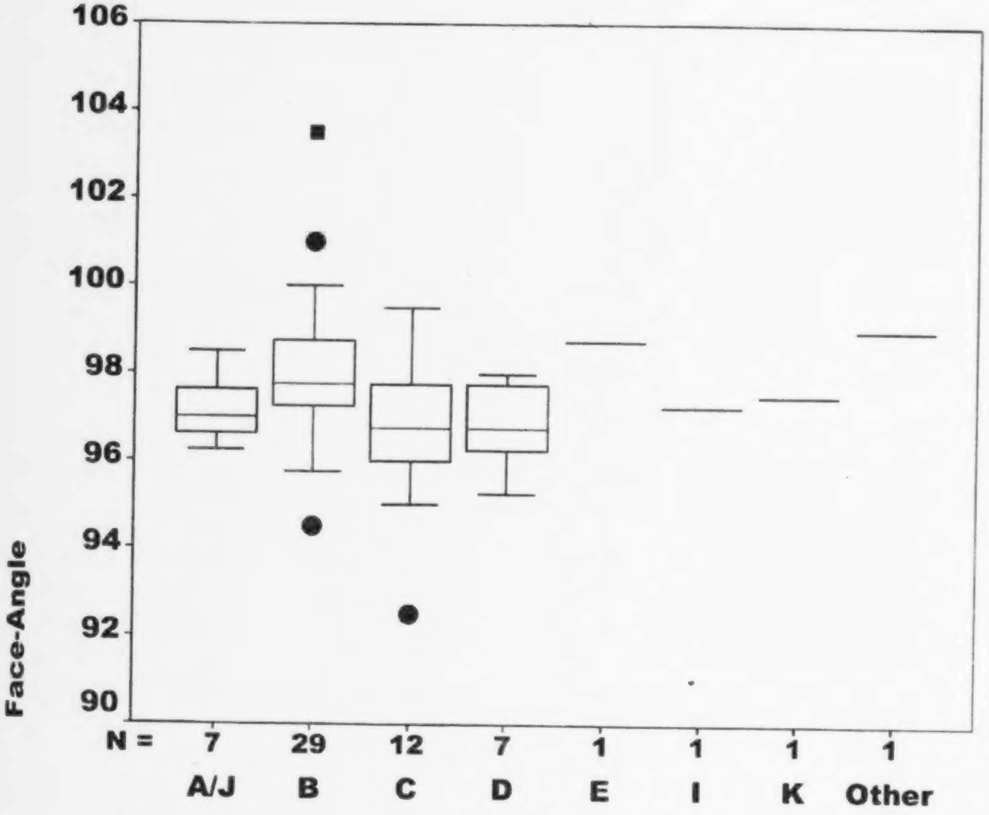

Figure 12.5: Fluted point face-angle boxplots by Parkhill site areas. For key see Figure 6.1.

problems of measuring flute length alluded to earlier. For the remaining characteristics although most areas seem similar, two areas may contrast with one another. For example, the points from Area E contrast with Area A/J in terms of thickness (Figure 12.10) and those from Area C seem narrower than those of Area E (Figure 12.9). However, in such cases the remaining areas overlap in such characteristics with both the contrasting areas so it is difficult to interpret these contrasts in any consistent way or in any consistent ordering. In fact, the only real contrast which single out an area as distinct from *all others* with measurable samples is the fact constriction width for Area A/J is much wider than all the other areas which are all similar to one another (Figure 12.13). The larger size of the A/J examples may suggest they are earlier and represent a different occupation of the site if our inference elsewhere that earlier examples have generally wider basal areas (e.g. Deller and Ellis 1992b:45) are of any merit. However, basal width *per se* is not that much different between the same areas (although A/J

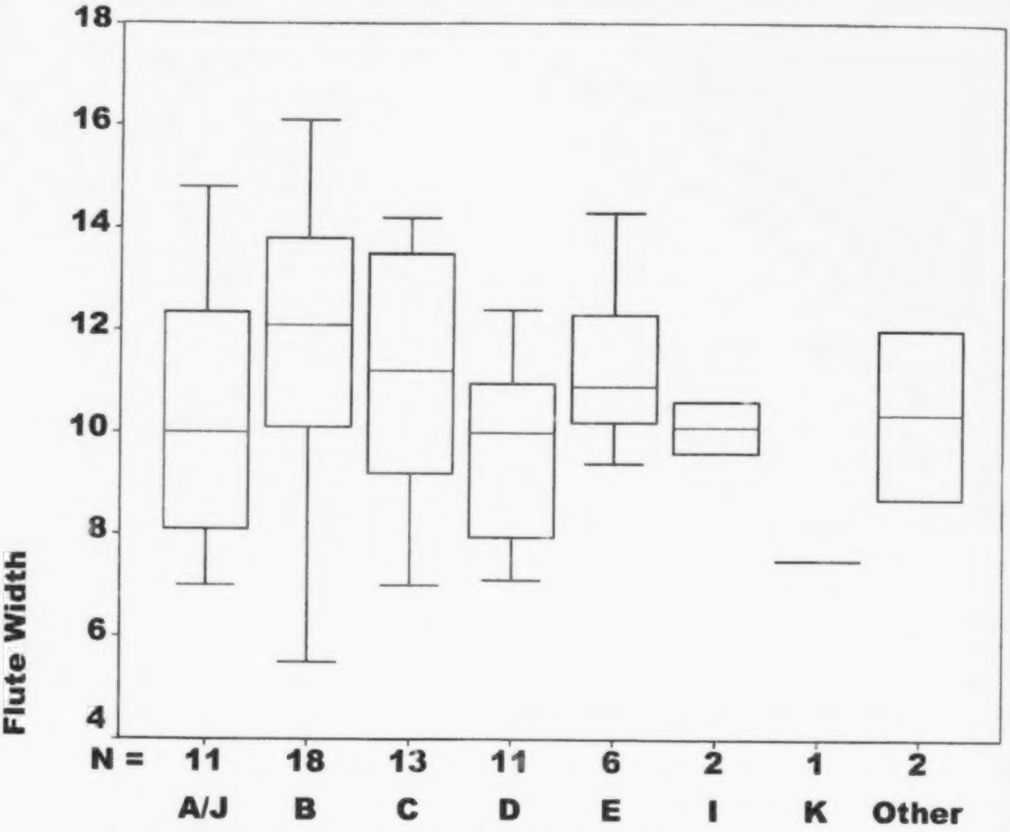

Figure 12.6: Fluted point flute width boxplots by Parkhill site areas. For key see Figure 6.1.

does have the widest bases on average; Figure 12.12). Also, as noted in previous discussions, the sample from Area A/J includes a high percentage of fluted items on Bayport and Onondaga cherts. Therefore, we can not rule out the fact that raw material rather than time changes are accounting for these differences.

Regardless, we believe, given the raw material differences between certain areas, that Parkhill was occupied several times. Such an interpretation is reinforced by some negative evidence to be discussed more fully later (and which contrasts with evidence from several other large sites) including: a lack of patterning in the overall arrangement of *all* site areas, considerable variability in spacing between the various areas, and lack of artifact refits between areas which witnessed the same suite of activities such as amongst the different strandline areas.

Given multiple occupations, one scenario could be that each visit to Parkhill may

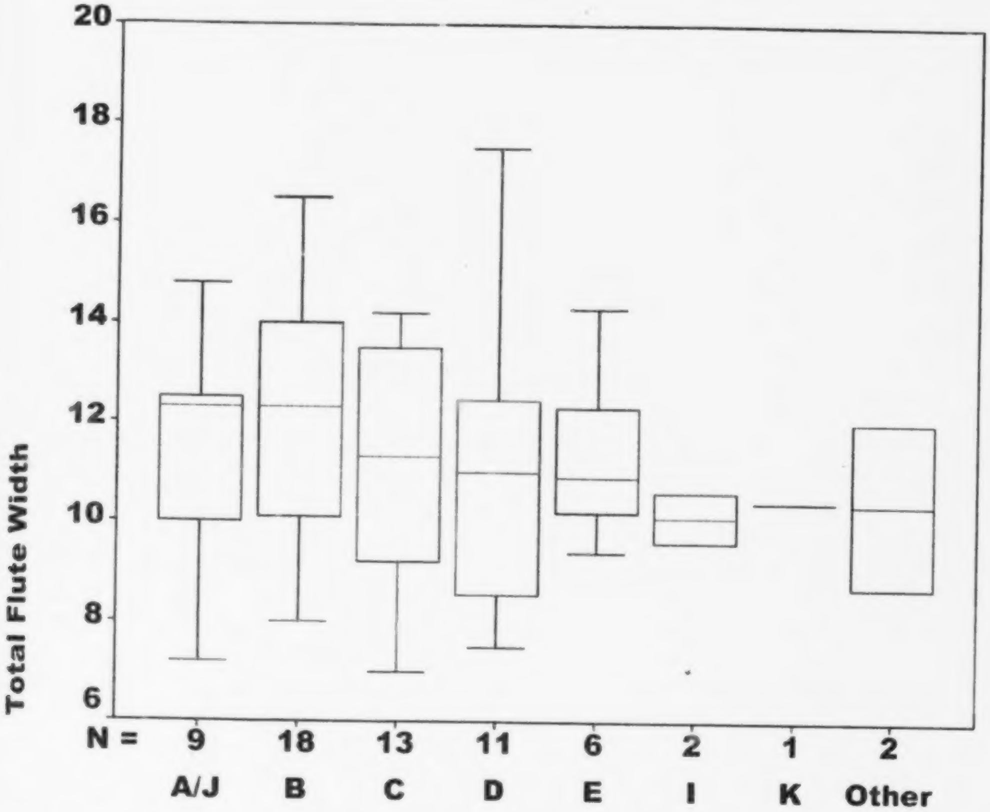

Figure 12.7: Fluted point total flute width boxplots by Parkhill site areas. For key see Figure 6.1.

have included the co-occupation of at least one interior (general domestic occupation area) and one strandline area (specialized point hafting and production area). It may be, as we will return to in later discussions, that the western areas were situated because they provided a good view to the west/southwest and north to watch for and monitor approaching game such as caribou along the lake edge whereas the eastern areas were farther away from that strand to be downwind of such game. In this interpretation, and if we can be permitted a direct analogy, one could see the strandline areas as analogous in function to the "hunting stands" used to monitor game observed by Binford (1978) among the modern Nunamuit at sites such as the Mask site. The western areas at Parkhill obviously differ from the Nunamuit examples in that as Binford (1978:331) observes, the material left at such sites was a result of attempts to reduce "the boredom level of the occupants during their watch for game" and not to the planned hunting activity. We are suggesting here that the dominance of evidence

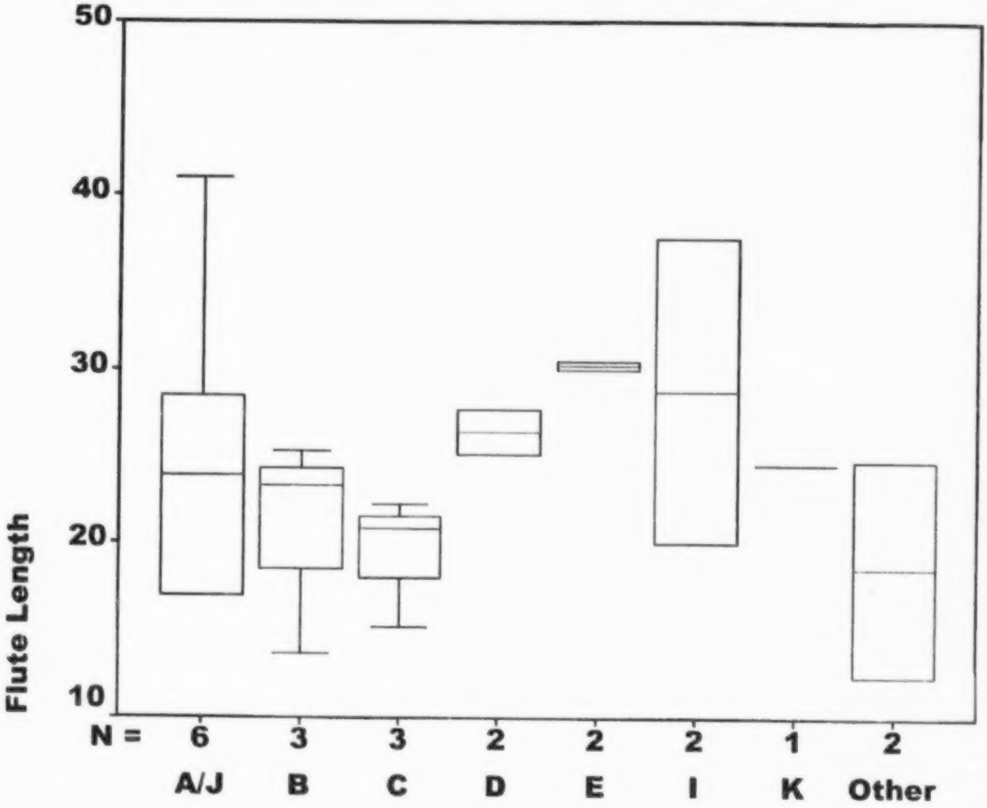

Figure 12.8: Fluted point flute length boxplots by Parkhill site areas. For key see Figure 6.1.

for point production and rehafting at the Parkhill strandline areas does relate directly to the planned rounds of hunting activities of the monitored game. Our suspicions are that stone weapon technology is much more time consuming to maintain and make ready due to its more fragile nature and a shorter use-life (see for example, Ellis 1997) than the modern weaponry used by the Nunamuit. Moreover, the production and maintenance of stone weaponry will produce much more in the way of material residues such that what is left behind does relate more directly to the actual function of the location.

To continue, the possibility of paired use of strandline/interior activity areas at Parkhill is suggested by the actual artifact refits between at least Area B and Area D. Since the interior areas vary in size, this might suggest that there was some degree of variation in the size of occupying groups. Of course, there are four strandline areas and five interior areas. In fact, there actually may be six interior areas because

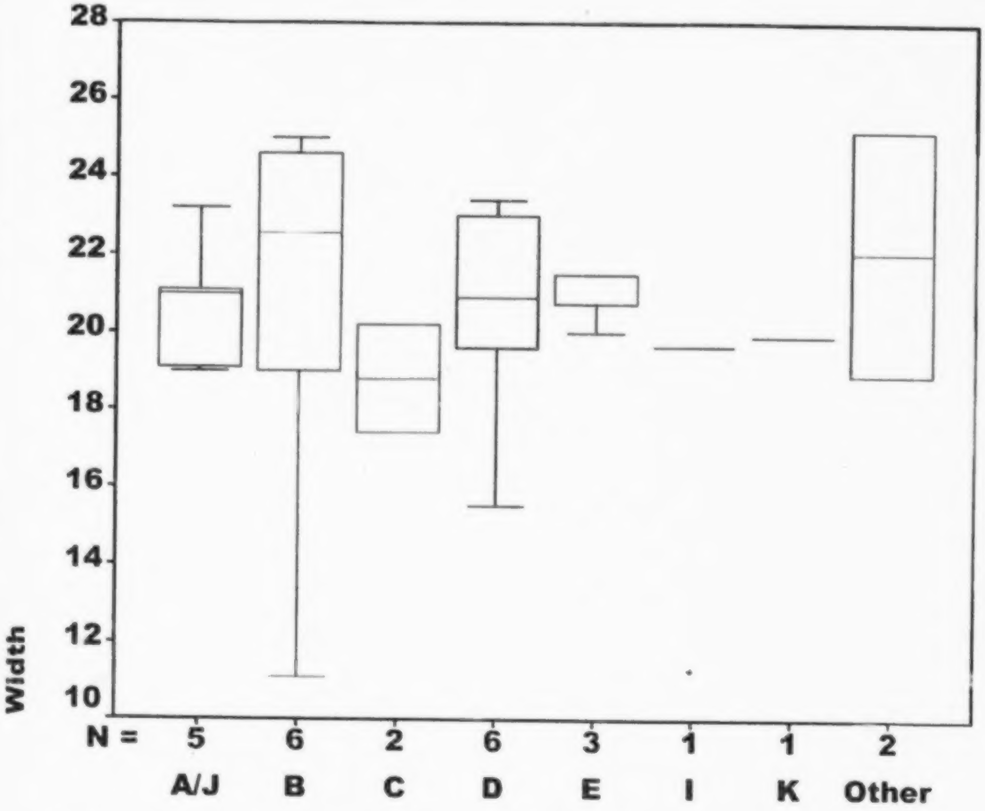

Figure 12.9: Fluted point width boxplots by Parkhill site areas. For key see Figure 6.1.

the Dixon site located some 250 m east of Area D could also be associated. Dixon is similar to the other interior areas at Parkhill in that there are few fluted bifaces in the small collection (2 of 15 or 13.3%) and the two items recovered are actually fore-sections which could be retrieved in activities such as butchering. It seems to differ however, in that trianguloid end scrapers are quite well represented (7 of 13 or 46.7% of the assemblage; Deller and Ellis 1992a) and in fact, Dixon actually also stands out as a site where those end scrapers are especially common (Figures 12.3 & 12.4).

Be that as it may, if each occupation represented use of two paired areas, the different numbers of interior and strandline areas could suggest that the latter areas were used on more than one occasion. However, we have no way to evaluate such an argument even though it seems to be a parsimonious one. Alternatively, it may be that some of the strandline areas which are poorly known with relatively small yields such as Area E might represent more than one

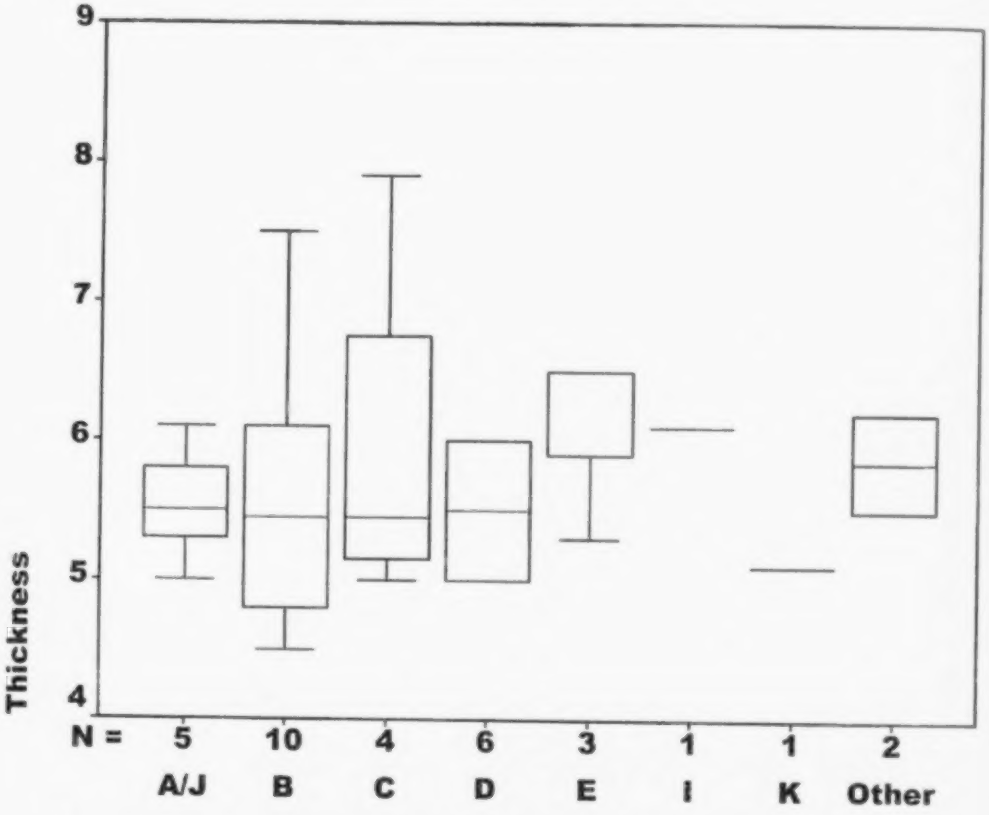

Figure 12.10: Fluted point thickness boxplots by Parkhill site areas. For key see Figure 6.1.

distinct area. It is even possible that the use of the site spatially varied on each occupation. For example, we have suggested (Deller and Ellis 1992a:29) that Area C, with its larger unifacial component, might actually represent an occupation in one area comparable to that represented by say, a combined occupation of Areas B and D. This suggestion was based on the fact the percentages of items from Area C is comparable to that obtained if one combines the Area B and D assemblages (e.g. 41.4% fluted bifaces in combined Areas B/D in comparison to 45.6% at Area C; 6.9% trianguloid end scrapers in combined B/D in comparison to 5.3% in Area C). However, we recognize the extremely tenuous nature of such arguments -- both areas B and D have only been partially excavated and if one increased the sample size in future work for either of these areas without adding to the sample from the other, such combined frequencies could change drastically.

Regardless of exactly how it was occupied, we do believe Parkhill was used on

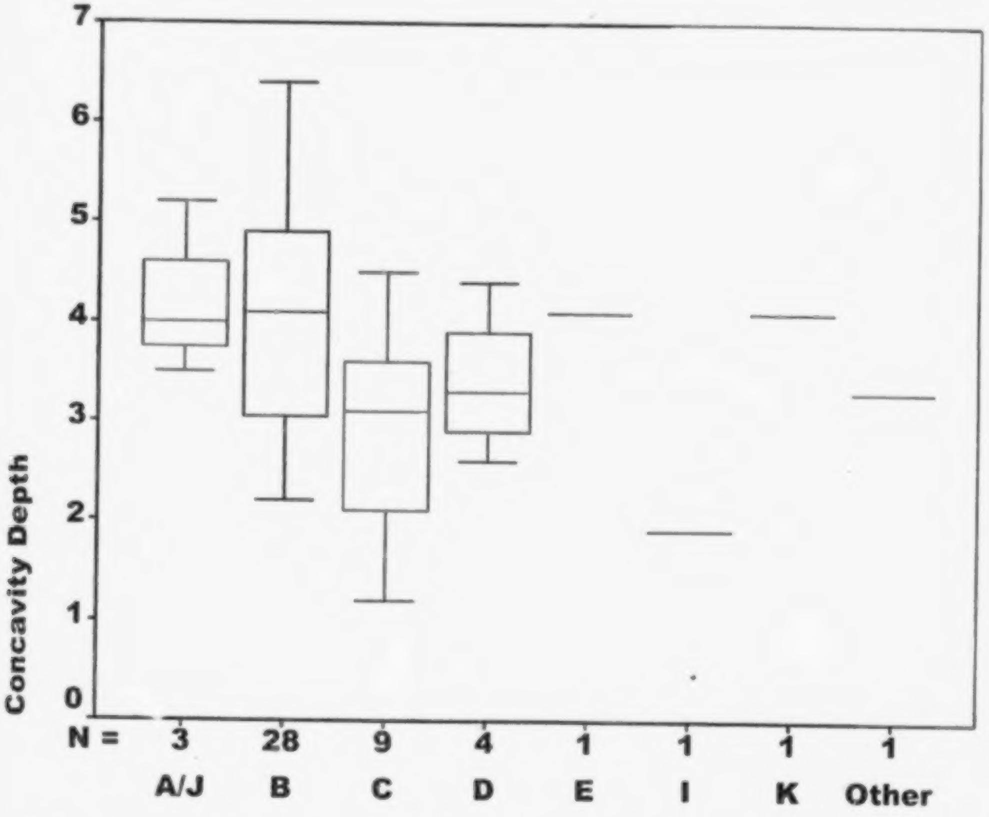

Figure 12.11: Fluted point concavity depth boxplots by Parkhill site areas. For key see Figure 6.1.

more than one occasion and that the similarity and very specialized nature of at least the strandline areas in terms of an emphasis on both fluted point and preform related activities indicates usage was probably similar during many of the occupations. If the site was used only once, given its large size one must certainly see Parkhill as an aggregation site of some kind. However, even if each eastern area, for example, represents a single occupation, some of these areas are still relatively large spatially and would have to have represented considerable populations or an aggregation site. For our purposes, we would include as an aggregation location any site where there is evidence of occupation by several small social units such as family groups. We have argued, for example, that the nearby Thedford II site which covers 7500 sq. ft. (ca. 700 m^2) is an aggregation site representing contemporary occupation by several, perhaps as many as five, small, probably family, groups (Deller and Ellis 1992b:116). Some of the interior areas at Parkhill are as large or larger than Thedford II (e.g. Areas D, H and I) and they can be at least one and one-half to three times as large. These

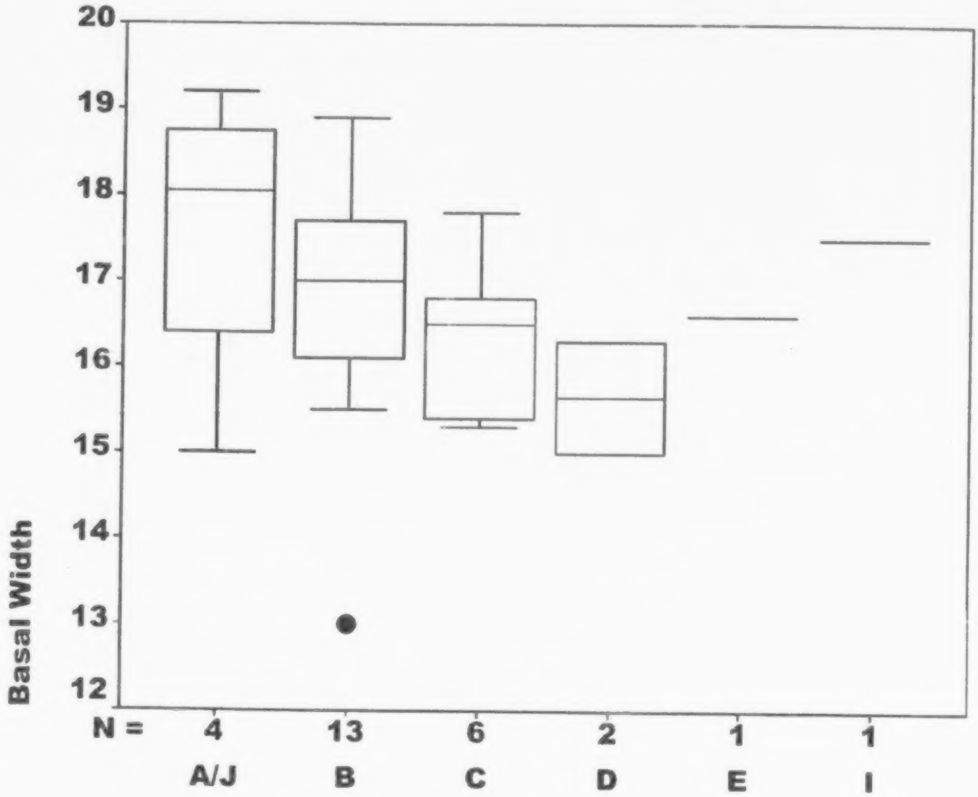

Figure 12.12: Fluted point basal width boxplots by Parkhill site areas. For key see Figure 6.1.

large sites or site areas contrast greatly with the vast majority of known Ontario sites. Most sites are very small (under 150-200 m^2 and certainly much smaller prior to ploughing) and ephemeral. In some cases the small sites probably represent task group sites given the predominance of a single tool class (e.g. Bolton [Deller and Ellis 1996]; Culloden Acres Area A [Ellis and Deller 1991; Ellis et al. 1992]; Snary [Wortner and Ellis 1993]). In other cases, a diverse tool inventory suggests small residential camps occupied by at most, one or two families (e.g. Crowfield [Deller and Ellis 1984]; Halstead [Jackson 1994, 1998]; McLeod [Muller 1999]; Murphy [Jackson 1996]). These smaller sites, irrespective of type, are the norm and the larger sites or site areas seen at Parkhill and Thedford II stand out as major exceptions.

External Comparisons

General Site Comparisons

As noted above, Parkhill seems to be very similar to several other reported sites in

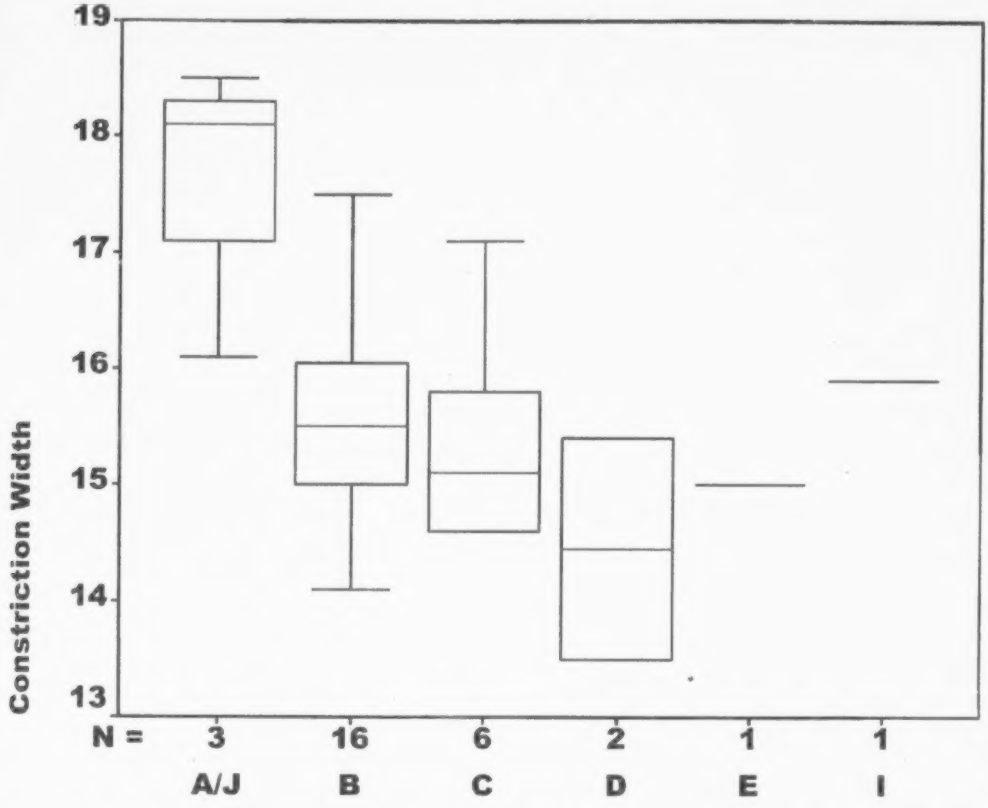

Figure 12.13: Fluted point constriction width boxplots by Parkhill site areas. For key see Figure 6.1.

that it is large and composed of several discrete concentrations of artifacts. Although it has been traditional in recent years to see all of these large sites as aggregation sites to carry out communal activities such as hunting of caribou (for example, Curran and Grimes 1989; Deller 1988; Deller and Ellis 1988; Gramly 1982; Meltzer 1984a, 1984b, 1988), it is becoming quite clear that there is considerable variation in such sites along a number of dimensions if one goes beyond spatial extent and number of site areas. In turn, this variation might be used to argue the sites were used for different purposes although we have yet to see anyone argue that these activities did not involve aggregation of some kind. This large site variation is summarized on Table 12.7 and discussed below. We focus only on those sites where more detailed information is available for at least several of the areas including Bull Brook, Massachusetts (Grimes 1979), Vail, Maine (Gramly 1982), Nobles Pond, Ohio (Gramly and Summers 1986; Seeman 1994), Debert, Nova Scotia (MacDonald 1968), and Fisher, Ontario

(Storck 1997) and make only passing reference to other, less documented, large sites.

These large sites do vary along several dimensions and several, including Parkhill, seem to be unique in many respects. Nonetheless, at least three (Bull Brook, Vail, and Nobles Pond) seem similar in several ways. Excluding the killing ground(s) at Vail (Gramly 1982, 1984), all areas at these three sites seem to be mirror images of one another in terms of assemblage content and to have quite diverse tool inventories (Table 12.7) -- they do not appear to be limited activity locations. There is also a high degree of patterning in the arrangement of the areas *vis à vis* one another at each site. At Bull Brook, for example, the 40+ areas or "hotspots" are arranged in a large circle and are in close juxtaposition, being separated from adjacent neighbours by ca. 10m-15m sterile areas (Grimes et al. 1984:166). Similarly, at Vail the eight reported occupation areas are in a roughly linear arrangement running parallel to a river and most seem to be separated from nearest neighbours by ca. 10 m bare areas. Some areas are a little more widely spaced. This spacing may be due to removal of some materials due to inundation in, and erosion by, a modern lake (see Gramly 1982:46). At Nobles Pond, the four of eleven clusters reported in detail from the site are arranged in a semi-circle with only short distance between them probably on the order of four or five metres prior to ploughing (see Seeman 1994: Figure 4). It is also noted that at least two other unreported areas apparently continue the semi-circular pattern (Seeman 1994:279).

Still another characteristic which singles out these sites concerns artifact refit patterns between the discrete areas. At Bull Brook (Grimes et al. 1984: Figure 6), Vail (Gramly 1982:48) and Nobles Pond (Seeman 1994: Figure 5) refits can be made between several of the different site areas with redundant activities. Finally, these sites appear similar in that all the areas seem relatively small with none exceeding about 200 m^2. Most are actually much smaller (e.g. <50-100 m^2), notably Vail and Bull Brook which had not been subject to cultivation (Gramly 1982:54; Grimes 1979; Grimes et al. 1984:166; Seeman 1994: Figure 4).

Overall, the close and evenly spaced patterned arrangement of areas, the similar raw material profiles in each area, and abundant artifact refits between several of the loci, has led most investigators to suggest these sites were occupied perhaps only once or certainly a minimal number of times (e.g. Dincauze 1993; Grimes 1979; Seeman 1994; Spiess 1984; Spiess et al. 1998:228-230; for an exception see Gramly 1982, 1985). Given the redundant and yet diverse assemblage inventories of each area, under such a scenario spatial variation is probably best explained as a product of social differences. For example, each area could represent the camp locations of one or more families (e.g. Gramly 1982:48). At least at Nobles Pond, detailed studies of the raw material distributions per site area indicate those areas are virtually identical in terms of the frequency of different stone raw materials, or even minor varieties of those materials, used at each site area. This information also suggests a minimal number of occupations (Seeman 1994:281).

An interpretation of a minimal number of occupations, combined with the number of such site areas (up to over 40 at Bull Brook; Grimes 1979: Figure 4), certainly suggests these sites represent aggregations of some kind (Dincauze 1993:49-50). Yet, there is no agreed

Table 12.7: Comparison of Large Multi-Area Sites.

Characteristic	Bull Brook	Vail	Nobles Pond	Debert	Fisher	Parkhill
Reference	Grimes 1979	Gramly 1984	Seeman 1994	MacDonald 1968	Storck 1997; Stewart 1997	this volume
Homogeneity of Activity Areas?	Yes	Yes	Yes	No(?)	No	No
Patterned Overall Layout?	Yes	Yes	Yes	No	No	No
Spacing of Multiple Activity Areas	Equal & ca. 10-15 m apart	Equal & ca. 10 m apart	Equal & ca. 4-5 m apart	Variable & ca. 15-70 m apart	Variable & ca. 40-130 m apart	Variable & ca. 60-210 m apart
Refits Between Multiple Activity Areas?	Yes	Yes	Yes	No	No	No
Raw Material Homogeneity between Activity Areas?	Yes	Yes	Yes	No?	No	No
Multiple Activity Area Size	ca. 50 m^2	<100 m^2	100-200 m^2	<200 m^2	250-2200 m^2	300-2000 m^2

*Killing ground is excluded from Vail; at Fisher, areas dominated by fluted preforms and formal tools such as scrapers are considered multiple activity locations.

upon explanation as to the reasons for such aggregation. One explanation, which is the more traditional one, sees these sites as aggregations for the purposes of communal hunting and specifically, of caribou (e.g. Gramly 1982; Spiess 1984). The presence of a kill site(s) near Vail, albeit apparently a small one, can be used to lead credence to such an interpretation (Gramly 1984). Some of these investigators also have stressed other reasons for aggregation and to varying degrees, such as for mate and information exchange (e.g. Seeman 1994:281-282) although these same investigators can see such aggregations as made possible by an abundant resource base such as caribou (for discussion see Dincauze 1993:51).

Recently, Dincauze (1993) has presented a different scenario to interpret these kinds of large sites. Dincauze (1993:49-51) notes, among other things, the evidence of the consistent use of certain limited number of stone raw materials at those sites and has argued that if they were aggregation sites of normally dispersed populations one might expect traces of lithic debris from several directions. We concur that this problem is definitely a weakness with the simple aggregation model -- but only if one assumes lithic raw material selection is governed simply by opportunity and availability and not other social/ideological reasons as one of us has argued (Ellis 1984, 1989). Regardless, a new interpretation is offered by Dincauze (1993) which sees these sites not as aggregations for communal hunting but rather, as the remains of the earliest inhabitants of the areas in which they occur. They are seen as marshalling sites where maximal groups moved into previously uninhabited areas and established a base (hence the use of a limited range of stone source materials). These marshalling camps could be used to send out scouting parties to explore the surrounding terrain and information could be accumulated at the camps so as to allow small sub-groups to subsequently disperse into those new areas (Dincauze 1993:51-56). In essence, these sites represent unique events rather than repetitive patterns of land use.

This model does have the advantage of explaining certain aspects of the archaeological record which the previous interpretations left unanswered or at least, had not as thoroughly explored. One potential problem with such a model is the fact there are apparently large sites left by groups who were not the first occupants of an area which also have a limited range of raw materials, notably Parkhill. Also, at Parkhill the raw materials used had to have been brought in from the northeast which would not expected in colonizing movements given the glacial barriers to the north and if these populations originated towards the west and south. Similarly the recent suggestion that much of the lithic raw materials at the Bull Brook site in southern Massachusetts and the Vail site in western Maine came from areas 100 to 350+ km to the east-northeast in the Munsungun lake region of northern Maine (Pollock et al. 1999:287-289) does not seem entirely consistent with normal views of colonization from the west or south.

Even if we accept these sites are marshalling areas, in our view, this interpretation would not necessarily rule out the use of the particular locations also for intercepting and exploiting caribou and especially given the kill site(s) associated with the Vail site. The extremely large size of a site like Bull Brook with its 40+ redundant areas which each may represent a family or other small-scale unit, implies a very large population must have been supported at this site. As well, despite a small size of 50 to 100 m^2, the individual areas at these sites seem to yield larger numbers of artifacts than many of the more spatially extensive areas at other sites to be discussed below. Importantly, they yield large numbers of hafted formalized tools such as trianguloid end scrapers. For example, at Bull Brook, of the 50 m^2 areas for which artifact inventories have been reported to detail, most have produced 40 to 60 trianguloid end scrapers alone (Grimes et al. 1984: Table 1). Similarly at Vail, most of these small areas have produced at least 35 of such tools and one produced over a hundred (Gramly 1982: Table 7). One also suspects large numbers per area at Nobles Pond since the 11 reported site concentrations have yielded over 1,500 of these items (Seeman 1994:276). The large number of such long-lived hafted tools at such sites implies a relatively long-term occupation which again would need to be supported by an adequate subsistence base such as could be provided through intercepting caribou. In addition, modern detailed use-wear studies of these trianguloid end scrapers at sites such as Udora, Ontario (Storck and Tomenchuk 1990:78) and Culloden Acres Area A, Ontario (John Tomenchuk: personal communication, 1996) confirms ethnographic expectations (e.g. Clark and Kurashina 1981; Gallagher 1977; Hayden 1979; Mason 1890) that these are hide-working tools. The large numbers of these trianguloid forms at sites such as Bull Brook, Vail and Nobles Pond would suggest hides were being processed in large quantities and to us suggests hunting of game was important during the time of their occupation. Overall, we no longer remain as convinced as we used to be (e.g. Deller and Ellis 1988:261) that communal hunting was an important activity at these particular large sites. Nonetheless, we are not convinced it was not important either.

Turning to other reported large sites such as Debert, Fisher and Parkhill, they tend to deviate, and in more than one way, from the previously described sites. All three of these sites do exhibit some similarities. For one thing, all these sites seem to exhibit significant assemblage variability between the different areas -- they are not redundant mirror images of each other. As noted, Parkhill has some areas where fluted biface-related activities were very strongly emphasized to the exclusion or minimization of other activities whereas there are other areas where these activities are much less important. Similarly, and as will be discussed more below, at Fisher, Ontario (Stewart 1997; Storck 1997) it is possible to recognize at least two kinds of locales: 1) areas with primary lithic reduction and extensive use of expedient flake tools; and 2) areas where final stage reduction predominates (especially for fluted bifaces) and formal tools such as piercers/gravers and end scrapers are more common. It should be stressed though, that none of the areas at that site seem as specialized or limited as the strandline areas at Parkhill. As a final example, at the Debert site (MacDonald 1968:131-133), it was argued there were some areas at the west end of the site (called Areas D and E) where fluted biface-related activities were more important. The more easternmost Debert areas had lesser numbers of such tools/preforms and were seen as more general purpose activity areas. Again, however, and as we will return to below, none of the Debert areas suggest the high degree of specialization seen in the Parkhill strandline areas.

These three sites also are similar and contrast with those previously discussed in that they lack refits between the unspecialized multiple activity locations although sampling problems may very well be at work for a site like Parkhill as well as Fisher (see Stewart 1997:177). These other sites also contrast with Bull Brook, Vail and Nobles Pond in that they do not exhibit a high degree of spatial patterning in the overall arrangement of the areas and in that the reported areas can be widely separated from one another. There is no convincing evidence of overall patterning at Parkhill (Figure 12.1a), Fisher (Storck 1997; see Figure 12.1b), or Debert (MacDonald 1968: Figure 2; and perhaps at the Shoop and Gainey sites as well; see Fogelman 1986: Figures 14 and 15; Simons et al. 1984). Most areas are more widely separated from one another at distances to nearest neighbours on the order of 15 to 200+ metres. In some comparisons, however, there is a problem of scale here (see Spiess et al. 1998: Figure 13). For example, within the larger interior areas at Parkhill, which are larger than those at almost all the other sites discussed here (see below) and where several diverse activities seem to have occurred, there might have been actually several clusters in close juxtaposition -- clusters which were comparable in size to what is seen at sites such as Bull Brook, Vail and Nobles Pond. However, even if that is the case, the fact Parkhill has several of such areas would suggest it differs significantly from these sites in that it has many more occupations. Such a problem can not be resolved easily with existing data.

Although there are those who suggest Debert represents one occupation (e.g. Dincauze 1993; Spiess 1984), the wide dispersion of areas, the lack of overall patterned arrangement of areas, and absence of refits between the areas suggest sites like Debert, Fisher and Parkhill were occupied on several occasions (e.g. MacDonald 1968:133-134; Storck 1997:266; Stewart 1997:188). In addition, at least at Fisher (Stewart 1997:184-185) and Parkhill, variability in raw material use between areas would also suggest differing occupations. However, despite such similarities, there are a number of differences between Parkhill and these other two sites which can be discussed in more detail here.

Parkhill and Debert

As noted earlier and elsewhere (Deller and Ellis 1992a:28), we find Debert to be quite similar, if not the most similar, to Parkhill in terms of overall layout. Besides similarities noted above, at Parkhill, the highly specialized strandline Area B at the west edge of the site can be linked by artifact cross-mends to the less specialized Area D more to the east. Similarly, at Debert, one of the two western site areas with *relatively* high percentages of fluted bifaces can be linked by refitted artifacts to more than one of the more generalized activity areas at the east side of the site (MacDonald 1968:133). We have even gone so far as to suggest, following MacDonald (1968:131), that the western areas at Parkhill with their dominance of items such as fluted bifaces are male-related activity areas which, because of their location, were used to monitor areas to the west/southwest or north of the site for game.

Despite these similarities, such an interpretation does not mean the sites are identical. In fact, they differ in several ways. At Debert, for example, the more general activity locations to the east all seem to be comparable in size to those at the previous sites (e.g. up to ca. 200 m^2) although given the fact the site was not ploughed its size may be deemphasized in comparison to sites such as Parkhill. Moreover, there had been a great deal of disturbance at Debert which may have truncated several of the areas resulting in minimal size estimates. In any case, at Parkhill, and in contrast to Debert, some of the multiple activity interior locations are quite large and can be up to ten times larger (e.g. 2,000 or more m^2). This difference can not be adequately explained by ploughing disturbance. If each eastern area at both sites does represent a single occupation, it was often by quite large groups at Parkhill in comparison to the comparable areas at Debert. At the same time, despite the smaller spatial extent of all the areas at Debert, even largest eastern interior areas at Parkhill, or for that matter, the strandline areas, do not seem to have anywhere near the very large inventories of a site such as Debert. For example, it was not uncommon for Debert areas to yield 120 to over 300 end scrapers alone in a very small spatial area. Indeed, in these regards Debert seems to resemble more sites such as Bull Brook, Vail, and Nobles Pond where, as noted above, despite spatially small areas, considerable numbers of items such as end scrapers were recovered. It is possible that the lack of intensive investigation of the eastern site areas at Parkhill in comparison to Debert may account somewhat for such differences -- if they do not, the lower yields at Parkhill would suggest briefer occupations.

Another contrast between Parkhill and Debert concerns the more specialized areas at the western margins. As indicated in previous discussions, the strandline areas at Parkhill are demonstrably very specialized given the high percentages of fluted bifaces and comparatively little else. The Debert western areas (D and E) can also be seen as having a greater emphasis on activities involving such items in comparison to other areas. For example, Areas D and E at Debert yielded 11.17% and 16.66% fluted bifaces whereas all the remaining eastern areas at that site produced under 5.15% fluted bifaces and some areas lacked these items entirely (MacDonald 1968: Table 3). Nonetheless, this emphasis or contrast is nowhere near that seen at Parkhill where the western areas have 45% or more fluted bifaces and the eastern areas less than, and often much less than, 16.5% of such items. Indeed, comparatively speaking, even Areas D and E at Debert seem unspecialized in relation to Parkhill in terms of fluted biface-related emphases. At a broader level, given that Debert was much more intensively investigated than Parkhill, it is notable that both sites have produced comparable absolute numbers of fluted bifaces (133 at Parkhill as compared to 140 at Debert; MacDonald 1968:70). These data suggest that fluted biface related activities were much more important at Parkhill.

Parkhill and Fisher

Turning to Fisher, this site is located in southcentral Ontario some 200 km northeast of Parkhill (Figure 12.1b). It is very useful to examine several of the Fisher site similarities and contrasts with Parkhill since it is the only other large fluted point site yet reported in detail from Ontario. Also, it has yielded the distinctive Barnes point of the Parkhill Phase and so is the most closely related culturally to Parkhill of all the known larger sites. Moreover, and as is the case at Parkhill, Collingwood chert predominates among the assemblage with smaller amounts of material such as Bayport, Onondaga and Kettle Point. In fact, Collingwood chert crops out in the general vicinity of the site with the nearest known primary sources being ca. 20 km away to the west (Storck 1997:276). Too, unlike several or perhaps all of the large sites discussed earlier like Bull Brook, and Nobles Pond, it is generally believed that Parkhill Phase sites do not represent the earliest occupations of the area (see especially, Ellis and Deller 1997) and so factors such as colonization of new areas are of less relevance in explaining their characteristics. Finally, comparison with Fisher will serve to highlight some aspects of Parkhill which will aid in assessing its basic nature.

As noted above Fisher has some similarities to Parkhill beyond simply size and having several areas. It even has some areas where fluted biface related activities seem to be more important than others although again, even in these areas fluted bifaces occur in much smaller percentages of the area totals than the western areas at Parkhill (e.g. Table 12.2). Nonetheless, there are some major differences between these sites.

First, although there is clear areal variability in activities at Fisher, these activities do not seem to match the distinctions at the Parkhill areas. As noted earlier, there seems to be at least two kinds of activity areas at Fisher. One kind of area has abundant evidence of primary lithic (e.g. core) reduction and extensive use of expedient flake tools and is represented by areas such as C and F (Figure 12.1b). In contrast, the second areas have a focus on final stage lithic reduction, especially of fluted bifaces, and formal tools such as gravers and end scrapers are more common (e.g. Areas C-East and D). There is no suggestion at Fisher of major overall patterning of these kinds of areas such as the east-west distinction of the two area classes noted at Parkhill. However, the Fisher site investigators suggest repetitive occupations of that site with use of at least one set of the two kinds of areas in close spatial juxtaposition during each of these occupations (e.g. simultaneous occupation of Areas C and C-East in one occupation, Areas F and D in another occupation, etc.; see Figure 12.1b). Such pairing is supported by similarities in raw material profiles between at least some of the paired areas, and a repetitive patterning of such pairing at least three times amongst the most extensively investigated areas at the site (see especially Stewart 1997). These interpretations suggest that the areas with extensive evidence of primary lithic reduction are more special purpose areas and perhaps not occupation or domestic living space at all, the separation being due to a desire to keep more domestic areas free of large debris. In fact, close proximity to the lithic source probably accounts for the presence of primary core reduction in general, as well as abundant evidence of early stage biface preform reduction, at Fisher as opposed to Parkhill which is a considerable distance away from the lithic source and where core reduction and early stage biface reduction did not occur. Storck (1997:281) suggests the presence of nearby toolstone sources was a reason for the occupation of the Fisher site.

Another contrast with Parkhill concerns area size and its relationship to activity variation. At Parkhill the strandline areas which emphasized fluted biface-related activities seem to be uniformly smaller than some of the interior areas which had different activity emphases. The individual areas as a whole at Fisher, vary considerably in size (Storck 1997: Table 2.1) but unlike Parkhill, size variation does not correlate with the activity variation at those sites. For example, site areas at Fisher with abundant evidence of primary manufacture (Areas C, F and b) range from ca. 250 to 2200 m^2 respectively. Similarly, the areas with more of an emphasis on fluted biface related activities as well as that of other tools such as gravers (Areas B, C-East, D) also exhibit considerable variation (from 250 to 2200 m^2). This contrast suggests more variable use in terms of intensity of occupation than that seen at Parkhill. However, as noted earlier, the variation in the size of interior areas at Parkhill does suggest perhaps that the size of occupying groups may have varied from year to year.

A third contrast with Parkhill concerns the nature of fluted biface production at Fisher. Fisher has yielded an extremely large number of channel flakes (1012) and there are at least two site areas which each yielded over 400 such fragments (Storck 1997: Table 2.4). We know of no site or site area in eastern North America which has anywhere near the frequency of channel flake fragments seen at Fisher. Indeed, only the Lindenmeier, Colorado Folsom site with 948 such fragments (Wilmsen and Roberts 1978: Table 90) appears to come close in absolute numbers. The large number of channel flakes may be emphasized in comparison to Parkhill because few areas at Parkhill have been thoroughly excavated. On the other hand, there are many areas at Fisher which also were not intensively investigated so we tend to believe Fisher has considerable evidence for preform fluting beyond that seen at Parkhill in absolute terms. Of more importance as a difference from Parkhill is the distribution of fluted bifaces by finished points or preforms at Fisher. The distribution of the points assignable to the point or preform category at Fisher and Parkhill is shown on Table 12.8. To belabour the obvious, a G-Test (see Sokal and Rolf 1969:599) of the distribution shown on Table 12.8 yielded a value of 87.804 (df=1; p<.005) indicating that there is a significantly higher than expected number of points versus preforms at Parkhill in comparison to Fisher. In fact, it is worth noting that Parkhill Area B alone, only an estimated third of which was excavated, has yielded more finished point fragments (N=58) than all the Fisher site areas, including several extensively excavated ones, combined (N=44; Storck 1997: Table 2.2).

The Fisher and Parkhill points are technologically identical and one can assume consistent failure rates in fluting. The much larger number of fluted preforms in comparison to discarded finished points at Fisher strongly suggests to us that the Fisher site inhabitants were producing many more points than necessary in order to meet immediate needs or needs during the Fisher site occupations themselves. Presumably, the points being manufactured included many which were designed for use at times when the inhabitants were away from the lithic sources at sites such as Parkhill. Perhaps this minimized the number of points which broke in fluting when away from lithic source areas and minimized transportation costs. Be that as it may, actual finished fluted bifaces at Parkhill are absolutely and in comparison to preforms much more common than they are at Fisher -- despite the fact Fisher is a larger site and was more thoroughly investigated. What this suggests strongly to us is that the actual use of fluted bifaces during the occupations was much more important at Parkhill than it was at Fisher.

Table 12.8: Fluted Points and Preforms, Parkhill and Fisher.

Site	Points	Preforms	Total
Parkhill	106	15	121
Fisher	44	81	125
Totals	150	96	246

Table 12.9: Frequency of End Scrapers and Retouched Flakes, Fisher and Parkhill Sites.*

Site Area	N	End Scrapers	Retouched Flakes
Fisher B	437	12(2.8%)	139(31.8%)
Fisher C-East	102	3(3.0%)	19(18.7%)
Fisher C	274	3(1.1%)	157(57.3%)
Fisher D	167	5(3.0%)	30(17.9%)
Fisher F	180	3(1.7%)	93(50.5%)
Fisher b	119	4(3.4%)	65(54.6%)
Parkhill B	102	1(1.0%)	12(11.8%)
Parkhill C	57	5(8.77%)	2(3.51%)
Parkhill D	115	30(26.09%)	3(2.6%)

*end scraper totals excludes narrow end scrapers; only includes areas with 50 or more items.

Another difference between Parkhill and Fisher is that the latter has many more informal simple flake tools like retouched flakes and more formalized tools such as end scrapers seem very rare. In contrast, Parkhill has few such simple tools. For example, Table 12.9 shows the frequency of end scrapers and simple retouched flakes (worked/utilized at Fisher) for all the Fisher areas and Parkhill areas (cores and non-siliceous tools were omitted from area totals) where samples sizes exceed fifty items per area. Since trianguloid end scrapers are not readily sorted out at Fisher from other forms, this table lumps together all end scraper forms discussed separately at Parkhill except for narrow end scrapers, which are classified at Fisher in the beaked scraper category. Assuming these totals are representative of all areas and types of areas at the sites, it seems clear that end scrapers are very rare at Fisher. In contrast, they seem to be relatively common at some areas at Parkhill (e.g. Area D) and even moreso if we include the Parkhill trianguloid forms subsequently recycled into other uses – a practice not reported from Fisher. In fact, excepting Area B at Fisher which has twelve end scrapers, no area at Fisher yielded more than five of these tools. This low frequency obviously also contrasts markedly with the sites noted earlier like Vail, Bull Brook and Nobles Pond where literally hundreds of such items were recovered.

As for the retouched flakes, the frequency of those items varies markedly by area at Fisher as noted earlier such that there are two groups of areas including those with lower frequencies such as Fisher C-East and D with frequencies around 17 to 32% and other areas with much higher frequencies on the order to 50 to 57% (Table 12.9). None of the areas at Parkhill have as much as the areas where these tools are deemphasized at Fisher, with only Parkhill Area B with its several used channel flakes coming close (11.8%). Parkhill C and D have less than 4% of such tools. It is possible that the low proportion of these simple tools at Parkhill in comparison to Fisher also is a product of relative proximity to chert sources. At a site like Fisher close to the source and with evidence of primary manufacture, there is plenty of raw material available which could be expediently used whereas this is not the case at a site such as Parkhill. Therefore, at Parkhill there is more of a reliance on formalized, resharpened tools. The relative infrequency of end scrapers, trianguloid or otherwise at Fisher could be due to raw material availability as well. However, assuming trianguloid end scrapers are used predominatly in hide-working, the intensive labour required to process hides (see, for example, Hayden 1990) which favours hafted tools, would lead us to expect such tools regardless of proximity to lithic sources. Therefore, one can at least suggest that hide-working may have been much less important at Fisher than at Parkhill or at least, Parkhill Area D which is the only interior site area with a substantial artifact sample.

Overall, Fisher is much different than Parkhill in terms of: the presence of different kinds of activity areas, a low frequency of finished fluted weapon tips, the rarity of potential hide-working tools, and the emphasis in many areas on activities such as primary stone tool production rather than simply tool use/hafting activities or simply tool discard.

The Parkhill Site

As discussed earlier, it has been traditional to interpret large sites in the Northeast/Great Lakes such as Parkhill as aggregation sites where among other things, communal hunting of game was carried out. We have followed the lead of others going back to investigators such as Fitting (1965; Fitting et al. 1966) and MacDonald (1968:134) in such interpretations and have included Parkhill as such a site (Deller and Ellis 1992a:27). This interpretation does not mean that other things essential to the operation of Paleo-Indian society such as the finding of mates and exchange of information were not also carried out. We have always believed they were important reasons for aggregation beyond simply communal hunting but of course, have argued that the presence of larger numbers of game animals were needed to support such aggregations (e.g. Deller and Ellis 1988:261).

The above review of larger sites has indicated that there is a considerable amount of variation in these large sites and as we have hinted, we are no longer convinced all such sites were simply aggregations to carry out communal hunting of game animals and specifically, caribou. Nonetheless, as our comparisons have shown, Parkhill stands out as different from all other large sites in several respects and any attempt to explain the cultural context of the site and its place in settlement-subsistence systems must be consistent with these factors:

1) the site was occupied on more than one occasion;

2) during each occupation the activities seem to have been similar (for example, assuming paired use of the two different kinds of Parkhill areas, each use of the strandline areas involved an extreme emphasis on finished fluted biface discard and some degree of fluted biface production whereas more general activities seem to have occurred in the interior areas);

3) the estimated large size of some of the more generalized eastern activity locations suggests a degree of population aggregation occurred during occupations which was above the norm seen at the vast majority of reported sites from the central Great Lakes area;

4) the areas with evidence of an extreme emphasis on fluted biface related activities are all at the western edge of the site closer to the inferred strandline of Lake Algonquin/Ardtrea;

5) the use of fluted projectile tips, as indicated by the frequency of discarded finished points, was very important at Parkhill and seemingly more important than at any other large site yet reported in the Great Lakes and probably the whole Northeast;

6) at least at some of the interior Parkhill areas, the use of probable hide-working tools such as trianguloid end scrapers was important and it was specifically much more important at Parkhill than at a site such as Fisher;

and 7) the site was located adjacent to a major river-like inlet of a lake (Figure 2.11).

We continue to believe the most parsimonious explanation of the site in terms of these characteristics is that it was a location where, among other things, people did gather, although not necessarily in huge numbers, to intercept game and particularly, caribou. In fact, we believe it is the best candidate for such an aggregation site yet reported in detail among the larger Paleo-Indian sites of the Great Lakes/Northeast. Being adjacent to a major inlet, the site was in an situation identical to that seen among many modern northern hunters who found these locations ideal for intercepting caribou slowed as they had to cross such waters (see Burch 1972:347; Loring 1997:195). Historically, human groups could be thinly spread out watching for game to approach such a barrier and need not aggregate in one spot nor need they use the same spot on several occasions (Loring 1997:204-205). However, the Parkhill site was in a very special, perhaps unique location, at the corner of a major lake. Any game moving from southwest to northeast or vice versa which encountered the lake shore would naturally tend to follow the shore and be funnelled to the southeastern apex of the lake (the Thedford embayment) where the site and inlet occurred (Deller 1988:162; see Burch 1972:347). In short, the area would be a more predictable location than most as a crossing point where game would appear and a hunt be successful. Hence, the reuse of the location on a consistent basis and for the same set of activities. The western site areas at Parkhill, with their emphasis on point rehafting and manufacture would in fact be ideal locations for hunters to rest, produce and refurbish weapons and watch for game approaching along the lake shore. This factor could explain, as noted earlier, why those fluted biface dominated areas were consistently situated in that location with perhaps general occupation areas to the east or downwind. MacDonald (1968) has produced a similar argument for the placement of the more fluted biface-dominated areas at Debert in comparison to areas of more domestic debris. Kill sites lacking preserved fauna are difficult to locate although at least two fore-sections/complete fluted points which one would expect to characterize kill locations have been found on the strandline and at the inlet adjacent to Parkhill (Ellis and Deller 1986:42) which we would expect to be the ideal kill locations in such a scenario. The consistent emphasis on hunting would also of course explain why Parkhill has such a large number of finished discarded hunting weapons in comparison to all other known large sites.

Obviously, there is much we do not know about the Parkhill site, particularly the eastern interior site areas, which make parts of this argument rather tenuous. Nonetheless, we still believe these arguments to be quite viable.

PART IV: SUMMARY AND CONCLUSIONS

by Christopher Ellis and D. Brian Deller

CHAPTER 13

SUMMARY AND CONCLUSIONS

The Parkhill, Ontario site is the type site of the Early Paleo-Indian Parkhill Complex or Phase (Roosa 1977b). Investigations at the site in the early 1970's has provided information about this large (6 ha) multi-area site and some aspects of its paleoenvironmental setting in Late Pleistocene southwestern Ontario. Some 330 Paleo-Indian lithic tools and almost 6000 pieces of flaking debris were collected during these investigations. However, given that only three of nine known artifact concentrations at the site received any degree of excavation beyond a few test pits, these artifact totals undoubtedly represent only a fraction of the total site assemblage left by the Paleo-Indian inhabitants.

Although not directly dated by ^{14}C, typological dating suggests an age for the site of somewhere around 10,800 to 10,500 B.P. The paleoenvironmental investigations in the site vicinity, notably a core taken some 1.2 km south of the site up a creek tributary, suggest the site was located in a more open spruce parkland/woodland at the time of the occupation. In addition, this core revealed that a high water level in the Huron basin formed an elongated inlet which extended up the creek valley by the site. This lake level represented either Main Lake Algonquin or an immediate successor called Ardtrea and provides the first direct evidence for such a high water level in the southern Huron basin vicinity in the 11,000 to 10,500 year time period. The inlet deposits, although truncated by an erosional episode, seem consistent with the 605' a.s.l. elevation long attributed to that water level (e.g. Karrow et al. 1975). As a whole, the geological data are used to suggest the Parkhill site was adjacent to the southeastern corner of a triangular-shaped lake embayment and was bordered on the southeast by the large inlet which extended south into the interior.

The lithic assemblage from Parkhill mirrors than known from other Parkhill Phase sites in the area such as Thedford II (Deller and Ellis 1992b). Stone items were made primarily on Fossil Hill formation cherts from the Collingwood area some 175 km northeast of the site but small amounts of Michigan Bayport chert and Onondaga chert from other areas of Ontario or adjacent areas of New York state, were also employed. In addition, in at least one site area there is evidence for the minimal use of local Kettle Point cherts from secondary deposits. Analyses of flake blanks used for tools suggests that at least two kinds of standardized cores of a roughly conical and bifacial form were employed. The fact the flaking debris is uniformly of a small size and represents the later stages of tool manufacture, indicates the reduction of such cores took place elsewhere, probably nearer the sources employed.

In the tool assemblage only finished fluted bifaces and trianguloid end scrapers were common, suggesting activities such as hunting and hide-working were of major importance at the site. However, there is a diversity of other tool forms, albeit present in small numbers, such as large alternately bevelled bifaces, backed bifaces, hafted perforators, narrow end scrapers, and double-scribe piercers/gravers. Their presence at Parkhill reinforces the association of such tool types with the Parkhill Phase suggested at other sites, and given their distinctive nature, reinforces the utility of such objects in recognizing Paleo-Indian sites. The finished fluted biface assemblage from Parkhill is one of the largest reported from the Great Lakes area and provides an excellent sample with which to characterize the Barnes type and the range of variation within that type. Moreover, the analysis of the fluted biface assemblage has served to document some patterns of reworking not previously reported or recognized such as the reuse of broken fore-sections as tools and the reworking of bases by narrowing for rehafting. The analysis of the trianguloid end scraper sample also served to document some effects of resharpening and different hafting methods on scraper bit morphology.

Interpretations of the various site areas and overall site layout are hampered by small sample sizes. Nonetheless, analyses of artifact distributions, and comparisons with other reported large sites in terms of artifact assemblages, reveals that certain Parkhill site areas, called Areas A/J, B, C and E, are highly specialized ones devoted largely, almost exclusively in some cases, to the discard, rehafting and manufacture of fluted bifaces. The large spatial extent of these areas, combined with the number of discarded finished points, makes them unique among reported eastern fluted point sites or site areas. In fact, outside of the Barnes site in Michigan (Voss 1977; Wright and Roosa 1966), no site areas in general devoted as exclusively to fluted biface related activities have been reported anywhere. If any site or site area reported from a Paleo-Indian site deserves to be called a specialized activity area it is these fluted biface dominated areas at Parkhill and particularly Area B.

The fluted biface dominated areas at Parkhill are found located exclusively at the western site margins. In contrast, several other Parkhill site areas (Areas D, G, H, I and K), all located at the eastern edge of the site, seem to have much more diverse tool inventories and to be more general occupation areas. However, the assemblages reported from most are small and need to be augmented by future work. There is no doubt some of these areas are quite extensive, with the best documented Area D exceeding 2000 m^2. The fact one of these eastern generalized activity areas (Area D) can be linked to one of the specialized fluted biface dominated areas (Area B) by artifact cross-mends suggests the two kinds of areas are contemporary or at the very least, closely related. Differences in raw material use between the better documented site areas suggest the site was occupied on several occasions, as does the lack of overall patterning in the arrangement of areas in comparison to one another. It was suggested each occupation may have involved at a minimum, occupation of one eastern general occupation area and one specialized western site area. However, more complicated scenarios are possible. In fact, given what we know ethnographically about year to year variation in the exploitation of specific localities among foragers (e.g. Jochim 1991), the more complicated scenarios may be more realistic -- but they are simply too difficult to evaluate with current evidence. We also suggested that the emphasis on fluted biface related activities indicated the specialized western areas were used by males. The location of these areas on the western site margins closer to lake Algonquin/Ardtrea may have been chosen so that movements of caribou in the vicinity of the shore of that lake could be monitored while refurbishing or preparing tool kits.

Overall, Parkhill seems to differ in significant respects from every other large Northeastern Paleo-Indian fluted point site reported to date. Although it has been traditional in the past to interpret most large sites as aggregation sites for the communal hunting of caribou, it has now become traditional to dispute such interpretations in the more recent literature and we believe, for good reason. There is simply too much variation between these sites to argue they were *all* used for the same purposes. However, the location of Parkhill adjacent to a major water-crossing which would be ideal for intercepting caribou in annual movements, the dominance of weapon-related activities at a scale not seen elsewhere, and the apparent repetitive kinds of use of the site, leads us to suggest the idea Parkhill was at some point an aggregation site where communal hunting was at least one activity, is still a very viable one. In fact, and despite the fact much of the site remains uninvestigated, it may be that Parkhill is the best candidate for such a site yet reported.

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APPENDIX A: Fluted Point Data.

FC#	SITE AREA	TYPE	RAW MATERIAL	FISHTAIL
23	A/J	Complete	Bayport	Yes
25	A/J	Base	Onondaga	No
26	A/J	Base	Bayport	Slight
198	A/J	Base	Bayport	Yes
205	A/J	Complete	Collingwood	--
207	A/J	Fore-Section	Collingwood	--
1462	A/J	Base	Onondaga	Yes
1463	A/J	Complete	Collingwood	--
47	B	Base	Collingwood	Yes
48	B	Base	Collingwood	Yes
56	B	Base	Collingwood	No
62	B	Base	Bayport	Yes
65	B	Base	Collingwood	Yes
74	B	Base	Bayport	Yes
76	B	Complete	Collingwood	No
79	B	Base	Collingwood	Yes
85	B	Complete	Collingwood	No
94	B	Base	Collingwood	Yes
102	B	Base	Collingwood	Yes
118	B	Base	Collingwood	Yes
121	B	Base	Collingwood	Slight
126	B	Base	Collingwood	Yes
130	B	Base	Collingwood	No
141	B	Base	Collingwood	--
144	B	Base	Collingwood	Yes
146	B	Base	Collingwood	No
151	B	Mid-Section	Collingwood	--
153	B	Base	Collingwood	Yes
155	B	Fore-Section	Collingwood	--
158	B	Base	Collingwood	Yes
159	B	Base	Collingwood	Yes
167	B	Basal Half	Collingwood	Yes
168	B	Base	Collingwood	Yes
171	B	Basal Half	Collingwood	No
177	B	Base	Collingwood	Slight
197	B	Base	Collingwood	No

FC#	SITE AREA	TYPE	RAW MATERIAL	FISHTAIL
208	B	Base	Collingwood	--
255	B	Mid-Section	Bayport	--
260	B	Basal Half	Collingwood	Slight
263	B	Base	Collingwood	Yes
285	B	Base	Collingwood	Yes
293	B	Basal Half	Collingwood	Yes
294	B	Base	Collingwood	Yes
312	B	Base	Collingwood	Slight
313	B	Base	Collingwood	Yes
317	B	Fore-Section	Onondaga	--
320	B	Base	Collingwood	Slight
338	B	Base	Collingwood	Yes
339	B	Base	Collingwood	Slight
375	B	Base	Collingwood	Slight
464	B	Basal Half	Collingwood	No
511+	B	Complete	Collingwood	Yes
524	B	Base	Collingwood	Yes
127+	B	Mid-Section	Collingwood	--
209	C	Base	Collingwood	Yes
242	C	Mid-Section	Collingwood	--
403	C	Other	Collingwood	--
538	C	Base	Collingwood	Yes
543	C	Complete	Collingwood	--
774	C	Base	Bayport	--
776	C	Basal Half	Collingwood	Yes
780	C	Base	Collingwood	Yes
812	C	Base	Collingwood	Yes
819	C	Base	Collingwood	Yes
822	C	Base	Unknown	Yes
823	C	Base	Collingwood	Yes
840	C	Base	Collingwood	Yes
848	C	Base	Collingwood	--
849	C	Base	Collingwood	Yes
858	C	Base	Collingwood	Slight
871	C	Base	Collingwood	Yes
1464	C	Base	Collingwood	Yes

FC#	SITE AREA	TYPE	RAW MATERIAL	FISHTAIL
1	D	Fore-Section	Collingwood	--
2	D	Fore-Section	Collingwood	--
3	D	Base	Unknown	Yes
13	D	Base	Collingwood	Yes
195	D	Base	Collingwood	No
286	D	Complete	Collingwood	--
385	D	Base	Collingwood	Yes
399	D	Base	Collingwood	No
492	D	Base	Collingwood	Slight
1100	D	Complete	Onondaga	--
1461	D	Fore-Section	Collingwood	--
24	E	Fore-Section	Collingwood	--
200	E	Fore-Section	Collingwood	--
206	E	Complete	Collingwood	Yes
19	I	Complete	Bayport	Yes
204	K	Complete	Collingwood	Yes
196	Other	Fore-Section	Collingwood	--
1134	Other	Base	Collingwood	Yes

FC#	LENGTH	WIDTH	THICKNESS	BASAL WIDTH	CONSTRICTION WIDTH	CONCAVITY DEPTH
23	44.0	19.0	5.5	--	--	--
25	--	--	--	--	--	--
26	--	21.1	5.3			--
198	--	--	--	17.8	16.1	4.0
205	--	21.0	5.0	--	--	--
207	--	23.2	5.8	--	--	--
1462	--	--	--	19.2	18.5	5.2
1463	42.0	19.1	6.1	15.0	--	3.5
47	--	--	--	16.1	15.0	3.1
48	--	--	--	--	--	5.7
56	--	21.3	6.6	--	--	4.7
62	--	--	--	--	--	--
65	--	--	--	--	--	--
74	--	--	--	--	--	4.9
76	53.0	19.0	5.0		--	--
79	--	--	--	16.3	15.5	2.8
85	37.9	11.1	5.2	--	--	2.2
94	--	--	--	17.7	16.0	4.0
102	--	--	--	17.6	15.6	4.9
118	--	--	5.7	18.9	17.5	3.0
121	--	--	--	--	--	2.6
126	--	--	4.6	--	14.8	3.6
130	--	--	--	--	--	3.5
141	--	--	--	--	--	--
144	--	--	--	--	--	--
146	--	--	--	--	--	4.5
151	--	--	--	--	--	--
153	--	--	--	--	--	--
155	--	--	--	--	--	--
158	--	--	--	--	15.0	5.1
159	--	--	--	--	--	--
167	--	--	--	--	--	--
168	--	--	--	17.1	15.5	3.5
171	--	--	--	--	--	--
177	--	--	--	15.5	--	4.5
197	--	--	--	16.3	16.1	5.0

FC#	LENGTH	WIDTH	THICKNESS	BASAL WIDTH	CONSTRICTION WIDTH	CONCAVITY DEPTH
208	--	23.8	7.5	--	--	--
255	--	--	--	--	--	--
260	--	--	--	--	--	--
263	--	--	--	--	14.1	--
285	--	--	--	--	--	5.4
293	--	--	--	--	--	4.8
294	--	--	--	--	15.1	3.5
312	--	--	--	--	17.0	--
313	--	--	--	17.0	14.8	2.8
317	--	--	--	--	--	--
320	--	--	--	--	--	4.2
338	--	--	4.5	18.1	17.5	5.0
339	--	--	--	16.0	15.4	2.9
375	--	--	--	--	--	3.8
464	--	--	--	--	--	6.4
511+	--	24.6	6.1	--	--	4.4
524	--	--	4.8	18.8	15.7	3.0
127+	--	25.0	5.9	--	--	--
209	--	--	--	16.2	14.6	3.8
242	--	--	--	--	--	--
403	--	--	5.6	--	--	--
538	--	--	--	16.8	15.2	2.5
543	--	20.2	7.9	--	--	--
774	--	--	--	--	--	--
776	--	--	--	--	--	--
780	--	--	5.0	17.8	17.1	3.4
812	--	--	--	15.3	14.6	2.1
819	--	--	--	--	--	--
822	--	--	--	--	--	--
823	--	--	--	--	--	3.6
840	--	--	--	16.8	15.8	3.1
848	--	--	--	--	--	--
849	--	--	--	--	--	--
858	--	--	--	--	--	1.2
871	--	--	--	--	--	4.5
1464	--	17.4	5.3	15.4	15.0	1.8

FC#	LENGTH	WIDTH	THICKNESS	BASAL WIDTH	CONSTRICTION WIDTH	CONCAVITY DEPTH
1	--	21.8	5.0	--	--	--
2	--	23.4	6.0	--	--	--
3	--	--	--	16.3	15.4	2.6
13	--	--	--	15.0	13.5	3.4
195	--	15.5	5.0	--	--	--
286	--	20.0	5.4	--	--	--
385	--	--	--	--	--	--
399	--	--	--	--	--	3.2
492	--	--	--	--	--	4.4
1100	--	23.0	6.0	--	--	--
1461	--	19.6	5.6	--	--	--
24	--	21.5	6.5	--	--	--
200	--	21.5	6.5	--	--	--
206	--	20.0	5.3	16.6	15.0	4.1
19	52.2	19.7	6.1	17.5	15.9	1.9
204	52.0	19.9	5.1	--	--	4.1
196	--	25.2	6.2	--	--	--
1134	--	18.9	5.5	--	--	3.3

FC#	FACE-ANGLE	FLUTE LENGTH 1	FLUTE LENGTH 2	FLUTE WIDTH 1	FLUTE WIDTH 2	TOTAL FLUTE WIDTH 1
23	98.50	27.3	20.5	7.2	7.0	7.2
25	96.50	--	--	--	--	--
26	96.75	--	--	14.8	10.3	14.8
198	98.00	--	--	12.4	--	12.4
205	97.25	41.0	28.5	12.5	10.0	12.5
207	--	--	--	12.3	9.5	12.3
1462	96.25	--	--	--	--	--
1463	97.00	17.0	17.0	7.0	9.0	--
47	97.50	--	--	--	--	--
48	99.00	--	--	--	--	--
56	97.75	25.3	--	12.1	--	12.1
62	98.00	--	--	13.5	12.5	13.5
65	94.50	--	--	--	--	--
74	98.25	--	--	--	--	--
76	98.00	--	--	--	--	--
79	98.50	--	--	--	--	--
85	103.50	23.3	--	5.5	--	9.2
94	97.75	--	--	14.5	--	14.5
102	--	--	--	--	--	--
118	97.25	--	--	12.1	--	12.1
121	97.50	--	--	--	--	--
126	98.75	--	--	13.8	8.0	13.8
130	98.50	--	--	--	--	--
141	99.50	--	--	--	--	--
144	101.00	--	--	--	--	--
146	100.00	--	--	--	--	--
151	--	--	--	--	--	--
153	100.00	--	--	--	--	--
155	--	--	--	--	--	--
158	96.25	--	--	--	--	--
159	--	--	--	--	--	--
167	--	--	--	--	--	--
168	--	--	--	--	--	--
171	--	--	--	--	--	--
177	--	--	--	--	--	--
197	95.75	--	--	10.1	11.5	10.1

FC#	FACE-ANGLE	FLUTE LENGTH 1	FLUTE LENGTH 2	FLUTE WIDTH 1	FLUTE WIDTH 2	TOTAL FLUTE WIDTH 1
208	--	--	--	8.6	9.4	8.6
255	--	--	--	--	--	--
260	--	--	--	--	--	--
263	97.75	--	--	--	--	--
285	--	--	--	--	--	--
293	--	--	--	--	--	--
294	97.75	--	--	--	--	--
312	96.75	--	--	--	--	--
313	--	--	--	--	--	--
317	--	--	--	--	--	--
320	96.50	--	--	--	--	--
338	100.00	--	--	--	--	--
339	97.75	--	--	--	--	--
375	96.50	--	--	14.1	14.0	14.1
464	--	--	--	--	--	--
511+	97.50	--	13.7	16.1	10.5	16.1
524	96.50	--	--	--	--	--
127+	--	--	--	11.0	12.5	16.5
209	96.50	--	--	9.1	9.2	9.1
242	--	--	--	--	--	--
403	--	--	--	11.8	11.2	11.8
538	92.50	--	--	--	--	--
543	--	20.8	--	8.7	--	8.7
774	--	--	--	13.9	13.7	13.9
776	--	--	--	--	--	--
780	99.50	--	--	14.2	12.3	14.2
812	98.50	--	--	--	--	--
819	--	--	--	13.5	--	13.5
822	95.50	--	--	--	--	--
823	97.00	--	--	--	--	--
840	96.50	--	--	11.1	--	11.1
848	96.50	--	--	--	--	--
849	97.00	--	--	--	--	--
858	97.00	--	--	--	--	--
871	98.50	--	--	--	--	--
1464	95.00	15.2	22.2	7.0	9.7	7.0

FC#	FACE-ANGLE	FLUTE LENGTH 1	FLUTE LENGTH 2	FLUTE WIDTH 1	FLUTE WIDTH 2	TOTAL FLUTE WIDTH 1
1	--	--	--	12.4	12.1	12.4
2	--	--	--	10.0	10.9	10.0
3	96.75	--	--	--	--	--
13	96.25	--	--	8.7	7.5	8.7
195	96.25	--	--	--	--	--
286	95.25	25.1	27.7	7.5	7.1	7.5
385	--	--	--	--	--	--
399	97.50	--	--	--	--	--
492	98.00	--	--	--	--	--
1100	98.00	--	--	10.5	--	14.0
1461	--	--	--	8.4	11.0	8.4
24	--	--	--	11.3	9.4	11.3
200	--	--	--	12.3	10.2	12.3
206	98.75	30.0	30.5	14.3	10.5	14.3
19	97.25	37.5	20.0	10.6	9.6	10.6
204	97.50	24.5	--	7.5	--	10.4
196	--	--	--	--	--	--
1134	99.00	12.4	24.7	12.0	8.7	12.0

FC#	TOTAL FLUTE WIDTH 2	GRINDING LENGTH 1	GRINDING LENGTH 2	# OF FLUTES PER FACE	BANDING ORIENTATION
23	10.0	--	13.1	1--1	--
25	--	--	--	1--2	--
26	10.3	12.5	15.5	1--1	--
198	--	--	--	1--0	--
205	10.0	--	--	1--1	0-5
207	14.4	--	--	1--2	0-5
1462	--	20.0	19.6	1--1	--
1463	--	--	--	1--1	0-5
47	--	--	--	1--1	0-5
48	--	14.6	--	1--1	--
56	--	--	15.4	1--0	--
62	12.5	--	--	1--1	--
65	--	--	--	1--1	10-15
74	--	--	--	1--1	--
76	--	--	--	2--0	55-60
79	--	13.5	--	--	0-5
85	--	--	11.5	2--0	0-5
94	--	--	--	1--2	0-5
102	--	--	--	1--1	0-5
118	--	15.0	16.5	1--1	--
121	--	--	--	--	--
126	8.0	14.0	--	1--1	0-5
130	--	--	--	1--1	--
141	--	--	--	1--1	5-10
144	--	--	--	1--1	0-5
146	--	--	--	1--1	10-15
151	--	--	--	1--1	0-5
153	--	--	--	1--1	0-5
155	--	--	--	--	5-10
158	--	--	--	1--1	25-30
159	--	--	--	1--2	5-10
167	--	--	--	--	--
168	--	--	--	1--1	0-5
171	--	--	--	--	--
177	--	--	--	1--1	0-5
197	11.5	16.2	13.0	1--1	0-5

FC#	TOTAL FLUTE WIDTH 2	GRINDING LENGTH 1	GRINDING LENGTH 2	# OF FLUTES PER FACE	BANDING ORIENTATION
208	9.4	--	--	1--1	0-5
255	--	--	--	1--1	--
260	--	--	--	--	--
263	--	--	--	1--1	--
285	--	--	--	--	0-5
293	--	--	--	--	--
294	--	--	--	1--1	0-5
312	--	--	--	1--0	--
313	--	--	--	--	0-5
317	--	--	--	1--1	--
320	--	--	--	1--1	--
338	--	15.0	15.6	1--2	65-70
339	--	--	--	1--1	0-5
375	14.0	--	--	1--1	0-5
464	--	--	--	--	--
511+	10.5	--	17.8	1--1	5-10
524	--	--	--	1--1	--
127+	12.5	--	--	1--2	--
209	9.2	16.8	16.0	1--1	60-65
242	--	--	--	--	0-5
403	11.2	--	--	1--1	--
538	--	--	--	1--1	0-5
543	--	--	--	1--1	0-5
774	13.7	--	--	1--1	--
776	--	--	--	--	--
780	12.3	15.1	--	1--1	0-5
812	--	--	--	1--2	--
819	--	--	--	1--0	--
822	--	--	--	1--2	--
823	--	--	--	1--2	--
840	--	--	--	1--0	0-5
848	--	--	--	1--1	0-5
849	--	--	--	--	--
858	--	--	--	--	0-5
871	--	--	--	1--1	0-5
1464	11.3	16.2	17.6	1--2	--

FC#	TOTAL FLUTE WIDTH 2	GRINDING LENGTH 1	GRINDING LENGTH 2	# OF FLUTES PER FACE	BANDING ORIENTATION
1	12.1	--	--	1--1	0-5
2	17.5	--	--	1--2	0-5
3	--	--	--	1--1	--
13	7.5	--	--	1--1	0-5
195	--	--	--	0--0	--
286	12.5	--	--	1--2	--
385	--	--	--	--	--
399	--	--	--	1--1	--
492	--	--	--	1--1	0-5
1100	--	--	--	1--2	--
1461	11.0	--	--	1--1	0-5
24	9.4	--	--	1--1	--
200	10.2	--	--	1--1	--
206	10.5	11.4	10.2	1--1	0-5
19	9.6	14.2	12.1	1--1	--
204	--	--	14.0	2--0	5-10
196	--	--	--	0--0	80-85
1134	8.7	14.6	--	1--1	45-50

FC#	BARNES BASAL FINISHING	WIDTH/THICKNESS RATIO
23	Yes-One Face	3.5
25	Yes-One Face	--
26	Yes-One Face	4.0
198	No	--
205	Yes-Both Faces	4.2
207	Yes-Both Faces	4.0
1462	No	--
1463	Yes-Both Faces	3.1
47	Yes-One Face	--
48	Yes-One Face	--
56	Yes-One Face	3.2
62	Yes-One Face	--
65	Yes-One Face	--
74	Yes-One Face	--
76	Yes-One Face	3.8
79	Yes-One Face	--
85	No	2.1
94	Yes-One Face	--
102	No	--
118	Yes-One Face	--
121	--	--
126	Yes-One Face	--
130	Yes-One Face	--
141	Yes-Both Faces	--
144	Yes-One Face	--
146	Yes-One Face	--
151	--	--
153	--	--
155	--	--
158	Yes-One Face	--
159	No	--
167	--	--
168	Yes-One Face	--
171	--	--
177	--	--
197	No	--
208	Yes-Both Faces	3.2
255	Yes-One Face	--
260	--	--
263	Yes-One Face	--
285	--	--
293	--	--
294	Yes-One Face	--
312	Yes-Both Faces	--
313	--	--
317	--	--
320	Yes-One Face	--
338	No	--
339	No	--
375	Yes-One Face	--
464	--	--
511+	Yes-One Face	4.0
524	No	--
127+	--	4.2
209	Yes-Both Faces	--
242	--	--
403	Yes-Both Faces	--
538	Yes-Both Faces	--
543	--	2.6
774	No	--
776	--	--
780	Yes-One Face	--
812	Yes-One Face	--
819	Yes-Both Faces	--
822	No	--
823	Yes-One Face	--
840	Yes-Both Faces	--
848	Yes-One Face	--
849	--	--
858	--	--
871	No	--
1464	Yes-Both Faces	3.3

FC#	BARNES BASAL FINISHING	WIDTH/THICKNESS RATIO
1	--	4.4
2	--	3.9
3	--	--
13	No	--
195	No	3.1
286	Yes-One Face	3.7
385	--	--
399	No	--
492	Yes-One Face	--
1100	Yes-One Face	3.8
1461	--	3.5
24	Yes-Both Faces	3.3
200	Yes-Both Faces	3.3
206	Yes-One Face	3.8
19	Yes-One Face	3.2
204	Yes-Both Faces	3.9
196	--	4.1
1134	Yes-One Face	3.4

Appendix B: Field Catalogue Numbers of Illustrated Artifacts.

Figure	FC#	Figure	FC#	Figure	FC#	Figure	FC#
5.1a	19	5.2k	1462	5.3o	492	5.5e	1100
5.1b	206	5.2l	74	5.3p	312	5.5f	263
5.1c	204	5.2m	47	5.3q	146	5.5g	858
5.1d	286	5.2n	130	5.3r	339	5.5h	194
5.1e	354	5.2o	812	5.3s	285	5.5i	87
5.1f	543	5.2p	13	5.3t	840	5.5j	798
5.1g	23	5.2q	102	5.3u	3	5.5k	374
5.1h	85	5.2r	294	5.3v	399	5.6a	206
5.1i	819	5.2s	177	5.3w	159	5.6b	354
5.1j	313	5.2t	538	5.3x	141	5.6c	87
5.1k	144	5.2u	153	5.3y	464	5.6d	798
5.1l	774	5.3a	338	5.4a	196	5.6e	1100
5.1m	822	5.3b	118	5.4b	207	5.6f	1463
5.1n	320	5.3c	209	5.4c	1461	5.6g	858
5.1o	871	5.3d	524	5.4d	24	5.6h	197
5.2a	208	5.3e	158	5.4e	2	5.6i	118
5.2b	126	5.3f	168	5.4f	155	5.11a	92
5.2c	56	5.3g	74	5.4g	317	5.11b	537/851
5.2d	819	5.3h	25	5.4h	200	5.11c	677
5.2e	197	5.3i	849	5.4i	127	5.11d	342
5.2f	780	5.3j	375	5.4j	242	5.11e	134
5.2g	26	5.3k	48	5.5a	511/512	5.11f	272
5.2h	62	5.3l	94	5.5b	1	5.11g	107
5.2i	1134	5.3m	65	5.5c	403	5.11h	1250
5.2j	195	5.3n	198	5.5d	1463	5.12a	329

Figure	FC#	Figure	FC#	Figure	FC#	Figure	FC#
5.12b	1110	6.9d	185	6.11d	1218	6.18b	357
5.12c	1133	6.9e	241	6.11e	10	6.18c	143/1141
5.12d	1109	6.9f	1249	6.14a	10	6.18d	14
5.12e	1130	6.9g	404	6.14b	20	6.18e	17
5.13a	Dixon	6.9h	656	6.14c	462	6.18f	1460
5.13b	1110	6.9i	1218	6.14d	864	6.18g	420
5.13c	1109	6.9j	345	6.14e	186	6.18h	1108
5.13d	92	6.9k	276	6.14f	11	6.19a	1127
5.13e	204	6.9l	188	6.14g	1124	6.19b	1123
5.15a	365	6.9m	405	6.14h	214	6.19c	1144
5.15b	137	6.9n	216	6.15a	1143	6.19d	1136
5.15c	128	6.9o	1106	6.15b	5	6.20a	619
5.15d	342	6.9p	211	6.15c	343	6.20b	7
5.15e	148	6.9q	862	6.15d	4	6.20c	1139
5.15f	165	6.9r	4	6.15e	53	6.20d	1145
5.16a	325	6.10a	1122	6.15f	347	6.20e	1467
5.16b	330	6.10b	482	6.15g	187	6.20f	21
5.16c	881	6.10c	269	6.15h	775/1310	6.20g	322
5.16d	503	6.10d	213	6.16a	876	6.20h	1119
5.16e	142	6.10e	215	6.16b	1142	6.20i	555
5.16f	8	6.10f	1104	6.16c	649	6.20j	6
5.17a	1129	6.10g	779/788	6.16d	31	6.20k	748
5.17b	378	6.10h	22	6.16e	809	6.21a	1146
5.17c	218	6.10i	395	6.17a	184	6.21b	55
6.9a	16	6.11a	1143	6.17b	1103	6.21c	1248
6.9b	1102	6.11b	1127	6.17c	199	6.21d	499
6.9c	393	6.11c	55	6.18a	1137	6.21e	520

Figure	FC#	Figure	FC#	Figure	FC#
6.22a	406	6.22d	815/1336	6.22g	1118
6.22b	408	6.22e	1128	6.22h	1395
6.22c	809/1327	6.22f	337	6.22i	473

Appendix C: Data on Unifacial Tools and Blanks.

CAT. NO.	TYPE	RECYCLED FROM	RAW MATERIAL
1126	Simple Side Scraper	Not Applicable	Bayport
836	Simple Side Scraper	Not Applicable	Collingwood
1460	Simple Side Scraper	Not Applicable	Collingwood
1108	Simple Side Scraper	Not Applicable	Collingwood
420	Simple Side Scraper	Not Applicable	Collingwood
193/1141	Simple Side Scraper	Not Applicable	Collingwood
351	Simple Side Scraper	Not Applicable	Collingwood
174	Simple Side Scraper	Not Applicable	Collingwood
321	Simple Side Scraper	Not Applicable	Collingwood
1137	Simple Side Scraper	Not Applicable	Collingwood
14	Simple Side Scraper	Not Applicable	Collingwood
17	Simple Side Scraper	Not Applicable	Collingwood
867	Simple Side Scraper	Not Applicable	Collingwood
1101	Trianguloid End Scraper	Not Applicable	Collingwood
188	Trianguloid End Scraper	Not Applicable	Onondaga
281	Trianguloid End Scraper	Not Applicable	Collingwood
393	Trianguloid End Scraper	Not Applicable	Collingwood
405	Trianguloid End Scraper	Not Applicable	Collingwood
453	Trianguloid End Scraper	Not Applicable	Collingwood
656	Trianguloid End Scraper	Not Applicable	Onondaga
862	Trianguloid End Scraper	Not Applicable	Bayport
1249	Trianguloid End Scraper	Not Applicable	Collingwood
1106	Trianguloid End Scraper	Not Applicable	Collingwood
16	Trianguloid End Scraper	Not Applicable	Collingwood
1102	Trianguloid End Scraper	Not Applicable	Collingwood
241	Trianguloid End Scraper	Not Applicable	Collingwood
211	Trianguloid End Scraper	Not Applicable	Collingwood

CAT. NO.	TYPE	RECYCLED FROM	RAW MATERIAL
1105	Trianguloid End Scraper	Not Applicable	Collingwood
1218	Trianguloid End Scraper	Not Applicable	Collingwood
185	Trianguloid End Scraper	Not Applicable	Collingwood
216	Trianguloid End Scraper	Not Applicable	Collingwood
276	Trianguloid End Scraper	Not Applicable	Collingwood
345	Trianguloid End Scraper	Not Applicable	Collingwood
4	Trianguloid End Scraper	Not Applicable	Collingwood
404	Trianguloid End Scraper	Not Applicable	Collingwood
1125	Retouched Flake	Not Applicable	Collingwood
170	Retouched Flake	Not Applicable	Collingwood
360	Retouched Flake	Not Applicable	Collingwood
219/319	Retouched Flake	Not Applicable	Collingwood
38	Retouched Flake	Not Applicable	Collingwood
20	Laterally Notched End Scraper	Not Applicable	Collingwood
10	Laterally Notched End Scraper	Not Applicable	Collingwood
462	Laterally Notched End Scraper	Not Applicable	Onondaga
1143	Large Parallel-Sided End	Not Applicable	Bayport
187	Large Parallel-Sided End	Not Applicable	Onondaga
347	Large Parallel-Sided End	Not Applicable	Bayport
775/1310	Large Parallel-Sided End	Not Applicable	Other/Unknown
9	Large Parallel-Sided End	Not Applicable	Bayport
5	Large Parallel-Sided End	Not Applicable	Collingwood
53	Large Parallel-Sided End	Not Applicable	Collingwood
343	Large Parallel-Sided End	Not Applicable	Collingwood
22	Narrow End Scraper	Trianguloid End Scraper	Collingwood
395	Narrow End Scraper	Trianguloid End Scraper	Collingwood
1142	Narrow End Scraper	Not Applicable	Collingwood
31	Narrow End Scraper	Simple Side Scraper	Collingwood
1123	Narrow End Scraper	Concave Side with Spur	Collingwood

CAT. NO.	TYPE	RECYCLED FROM	RAW MATERIAL
649	Narrow End Scraper	Not Applicable	Collingwood
788/799	Narrow End Scraper	Trianguloid End Scraper	Onondaga
807	Narrow End Scraper	Simple Side Scraper	Collingwood
876	Narrow End Scraper	Not Applicable	Collingwood
11	Offset End Scraper	Not Applicable	Collingwood
1124	Offset End Scraper	Not Applicable	Collingwood
1104	Bibitted End Scraper	Trianguloid End Scraper	Collingwood
199	Bibitted End Scraper	Not Applicable	Collingwood
215	Bibitted End Scraper	Trianguloid End Scraper	Onondaga
1103	Thumbnail End Scraper	Not Applicable	Collingwood
184	End of Blade Scraper	Not Applicable	Collingwood
186	Fluted End	Not Applicable	Collingwood
864	Fluted End	Not Applicable	Collingwood
353	Simple Beak	Not Applicable	Onondaga
520	Simple Beak	Large Parallel-Sided End	Onondaga
1248	Simple Beak	Simple Side Scraper	Collingwood
499	Simple Beak	Large Parallel-Sided End	Collingwood
1119	Denticulate	Not Applicable	Collingwood
555	Denticulate	Not Applicable	Collingwood
1135	Denticulate	Not Applicable	Collingwood
322	Denticulate	Not Applicable	Collingwood
619	Notch/Borer/Denticulate	Not Applicable	Onondaga
1467	Notch/Borer/Denticulate	Not Applicable	Collingwood
21	Notch/Borer/Denticulate	Not Applicable	Collingwood
7	Notch/Borer/Denticulate	Not Applicable	Collingwood
1134	Notch/Borer/Denticulate	Not Applicable	Collingwood
1145	Notch/Borer/Denticulate	Not Applicable	Collingwood
55	Hafted Perforator	Not Applicable	Collingwood
1146	Hafted Perforator	Not Applicable	Collingwood

CAT. NO.	TYPE	RECYCLED FROM	RAW MATERIAL
337	Simple Piercer	Not Applicable	Collingwood
408	Simple Piercer	Not Applicable	Onondaga
466	Simple Piercer	Not Applicable	Collingwood
482	Simple Piercer	Trianguloid End Scraper	Onondaga
769	Simple Piercer	Trianguloid End Scraper	Bayport
809/1327	Simple Piercer	Not Applicable	Bayport
1122	Simple Piercer	Trianguloid End Scraper	Collingwood
1128	Simple Piercer	Not Applicable	Collingwood
213	Simple Piercer	Trianguloid End Scraper	Collingwood
473	Simple Piercer	Not Applicable	Collingwood
1118	Simple Piercer	Not Applicable	Collingwood
1395	Simple Piercer	Not Applicable	Collingwood
406	Simple Piercer	Alternately Retouched Side	Collingwood
815/1336	Simple Piercer	Not Applicable	Collingwood
6	Transverse Scraper	Not Applicable	Collingwood
1127	Concave Side with Spur	Not Applicable	Bayport
1136	Concave Side with Spur	Not Applicable	Collingwood
1144	Concave Side with Spur	Not Applicable	Collingwood
214	Other Uniface	Offset End Scraper	Collingwood
748	Triangular Uniface	Not Applicable	Collingwood

CAT. NO.	BANDING	AREA	CONDITION	BLANK TYPE	CURVATURE
1126	-	C	Proximal End	-	9
836	-	C	Relatively Complete	-	12
1460	0-5	D	Complete	Primary Top-Face	15
1108	0-5	D	Distal End	Secondary Top-Corner	-
420	85-90	D	Complete	Normal Side-Corner	-
193/1141	85-90	G	Complete	Primary Side-Face	15
351	80-85	D	Relatively Complete	Secondary Side-Corner	15
174	85-90	B	Relatively Complete	Tertiary Side-Face	12
321	85-90	B	Complete	Tertiary Side-Face	11
1137	15-20	G	Complete	End Biface Core	14
14	85-90	D	Complete	Secondary Side-Face	15
17	75-80	D	Complete	Secondary Side-Face	13
867	80-85	C	Relatively Complete	Secondary Side-Face	9
1101	-	D	Distal End	-	-
188	-	D	Complete	-	11
281	-	D	Distal End	-	15
393	-	D	Complete	-	13
405	25-30	H	Complete	-	13
453	85-90	D	Other Incomplete	-	6
656	-	D	Complete	-	11
862	-	C	Complete	-	9
1249	0-5	H	Complete	Secondary Top-Corner	12
1106	85-90	D	Complete	Normal Side-Corner	10
16	85-90	D	Complete	Primary Side-Face	10
1102	85-90	D	Complete	Secondary Side-Corner	9
241	85-90	C	Complete	Secondary Side-Corner	10
211	60-65	E	Complete	Tertiary Side-Face	9

CAT. NO.	BANDING	AREA	CONDITION	BLANK TYPE	CURVATURE
1105	70-75	D	Distal End	Normal Biface Core	9
1218	75-80	D	Complete	Normal Biface Core	9
185	70-75	D	Complete	Normal Biface Core	11
216	60-65	I	Complete	Normal Biface Core	8
276	25-30	C	Complete	Normal Biface Core	12
345	85-90	D	Complete	Normal Biface Core	10
4	60-65	D	Distal End	Normal Biface Core	9
404	-	D	Complete	Normal Biface Core	11
1125	-	K	Other Incomplete	-	15
170	15-20	B	Complete	Normal Biface Thinning	7
360	40-45	B	Complete	Normal Biface Thinning	6
219/319	0-5	B	Relatively Complete	End Biface Thinning	11
38	15-20	A/J	Complete	End Biface Thinning	-
20	85-90	D	Relatively Complete	Tertiary Side-Face	11
10	65-70	D	Complete	Normal Biface Core	5
462	-	D	Complete	Normal Biface Core	6
1143	-	H	Complete	-	15
187	-	D	Distal End	-	15
347	-	D	Distal End	-	15
775/1310	-	C	Distal End	-	15
9	-	D	Distal End	-	14
5	85-90	D	Distal End	Secondary Side-Corner	15
53	85-90	B	Distal End	Tertiary Side-Face	12
343	85-90	D	Distal End	Secondary Side-Face	15
22	0-5	D	Complete	Primary Top-Face	10
395	0-5	D	Relatively Complete	Secondary Top-Corner	10

CAT. NO.	BANDING	AREA	CONDITION	BLANK TYPE	CURVATURE
1142	85-90	G	Relatively Complete	Secondary Side-Corner	-
31	85-90	E	Relatively Complete	Tertiary Side-Face	-
1123	75-80	K	Complete	Normal Biface Core	10
649	80-85	K	Complete	Normal Biface Core	11
788/799	-	C	Complete	Normal Biface Core	6
807	75-80	D	Relatively Complete	Normal Biface Core	-
876	75-80	C	Complete	Secondary Side-Face	9
11	25-30	D	Distal End	Tertiary Top-Face	6
1124	85-90	K	Distal End	Secondary Side-Corner	3
1104	15-20	D	Relatively Complete	-	10
199	0-5	D	Relatively Complete	-	13
215	-	I	Relatively Complete	-	10
1103	75-80	D	Relatively Complete	-	15
184	0-5	D	Relatively Complete	Secondary Top-Corner	10
186	0-5	K	Complete	Tertiary Top-Face	8
864	85-90	C	Relatively Complete	Tertiary Side-Face	11
353	-	B	Complete	-	-
520	-	C	Relatively Complete	-	-
1248	85-90	D	Complete	Secondary Side-Corner	6
499	85-90	D	Relatively Complete	Secondary Side-Face	15
1119	0-5	A/J	Distal End	Tertiary Top-Face	15
555	75-80	D	Complete	Secondary Side-Corner	5
1135	85-90	A/J	Proximal End	Tertiary Side-Face	8
322	10-15	D	Relatively Complete	End Biface Core	10
619	-	E	Relatively Complete	-	15
1467	0-5	D	Relatively Complete	Tertiary Top-Face	15

CAT. NO.	BANDING	AREA	CONDITION	BLANK TYPE	CURVATURE
21	85-90	D	Complete	Tertiary Side-Face	10
7	85-90	D	Distal End	Tertiary Side-Face	15
1134	60-65	G	Relatively Complete	Normal Biface Core	13
1145	85-90	K	Complete	Normal Biface Core	10
55	0-5	B	Complete	-	11
1146	0-5	H	Relatively Complete	Normal Top-Corner	15
337	85-90	E	Complete	-	-
408	-	D	Complete	-	-
466	-	D	Relatively Complete	-	-
482	-	D	Relatively Complete	-	8
769	-	C	Relatively Complete	-	10
809/1327	-	C	Complete	-	11
1122	75-80	K	Relatively Complete	Tertiary Side-Face	11
1128	80-85	E	Complete	Tertiary Side-Face	10
213	80-85	D	Complete	Tertiary Side-Face	9
473	-	D	Complete	Normal Biface Thinning	-
1118	0-5	A/J	Complete	Channel Flake	-
1395	-	D	Other Incomplete	Channel Flake	-
406	85-90	I	Relatively Complete	Secondary Side-Face	15
815/1336	85-90	C	Complete	Secondary Side-Face	8
6	0-5	D	Complete	-	4
1127	-	C	Complete	-	13
1136	-	G	Other Incomplete	-	15
1144	-	H	Complete	Normal Side-Corner	5
214	0-5	H	Complete	Normal Top-Corner	4
748	0-5	D	Complete	-	4

CAT. NO.	TOOL LENGTH	TOOL WIDTH	TOOL THICKNESS	TOOL WEIGHT	BLANK LENGTH	BLANK WIDTH	BLANK THICKNESS
1126	-	33.2	5.6	-	-	-	5.6
836	-	15.0	4.1	-	-	-	4.1
1460	49.2	40.1	13.0	30.00	49.2	40.1	13.0
1108	-	31.1	16.0	-	-	-	16.0
420	50.1	41.4	13.3	25.25	-	-	-
193/1141	37.6	54.9	5.8	15.21	37.6	54.9	5.8
351	-	28.8	12.9	-	-	-	12.9
174	29.6	20.9	3.7	3.70	29.6	20.9	3.7
321	45.1	28.4	8.2	9.61	-	28.4	8.2
1137	100.5	47.2	7.2	52.04	100.5	-	7.2
14	55.6	49.8	13.9	39.79	55.6	49.8	13.9
17	53.8	35.3	15.0	24.78	53.8	35.3	15.0
867	53.7	28.3	10.1	-	-	28.3	10.1
1101	-	29.2	4.3	-	-	-	-
188	30.3	22.5	6.5	4.65	-	22.5	6.5
281	-	30.1	4.8	-	-	-	-
393	40.1	25.5	13.2	13.82	-	-	-
405	32.5	26.6	10.7	7.99	-	-	-
453	-	-	9.1	-	-	-	9.1
656	27.6	26.3	11.2	7.34	-	-	-
862	26.0	28.9	8.5	-	-	-	8.5
1249	34.9	22.3	6.1	6.13	-	22.3	6.1
1106	29.1	26.6	8.7	7.52	-	26.6	8.7
16	49.0	25.7	14.8	17.92	-	25.7	14.8
1102	40.0	25.0	10.5	10.78	-	25.0	10.5
241	38.7	22.7	10.4	8.16	-	22.7	10.4
211	34.5	28.9	8.5	10.24	-	28.9	8.5
1105	-	26.3	5.5	-	-	26.3	5.5

CAT. NO.	TOOL LENGTH	TOOL WIDTH	TOOL THICKNESS	TOOL WEIGHT	BLANK LENGTH	BLANK WIDTH	BLANK THICKNESS
1218	32.0	29.2	8.1	6.64	-	29.2	8.1
185	36.8	29.8	5.8	7.76	-	29.8	5.8
216	25.8	29.8	5.8	5.09	-	-	5.8
276	27.8	26.4	8.1	5.01	-	26.4	8.1
345	26.4	20.7	5.9	3.53	-	20.7	5.9
4	-	27.5	4.9	-	-	27.5	4.9
404	33.2	28.1	7.8	7.00	-	28.1	7.8
1125	42.2	23.7	6.8	7.17	-	-	-
170	20.2	19.3	3.1	1.11	20.2	19.3	3.1
360	18.8	25.5	3.0	1.85	-	25.5	3.0
219/319	44.6	34.4	2.8	3.61	44.6	34.4	2.8
38	22.3	14.6	2.0	0.93	22.3	-	2.0
20	-	23.9	7.0	-	-	23.9	7.0
10	42.1	23.6	6.5	6.47	-	23.6	6.5
462	29.8	24.4	5.3	4.57	-	24.4	5.4
1143	78.2	37.4	11.0	36.13	-	-	11.0
187	-	35.3	9.3	-	-	35.3	9.3
347	-	31.3	11.1	-	-	31.3	11.1
775/1310	-	-	-	-	-	-	-
9	-	27.0	8.2	-	-	27.0	8.2
5	-	34.5	9.9	-	-	34.5	9.9
53	-	34.3	8.2	-	-	34.3	8.2
343	-	38.2	14.4	-	-	-	14.4
22	31.6	24.0	7.2	7.67	-	24.0	7.2
395	35.7	23.5	7.3	6.23	-	-	7.3
1142	34.2	35.0	13.2	18.55	-	-	13.2
31	30.1	19.7	5.1	5.45	-	-	5.1
1123	54.1	18.8	5.0	6.57	54.1	-	5.0

CAT. NO.	TOOL LENGTH	TOOL WIDTH	TOOL THICKNESS	TOOL WEIGHT	BLANK LENGTH	BLANK WIDTH	BLANK THICKNESS
649	32.7	30.7	5.4	5.75	32.7	30.7	5.4
788/799	49.6	40.9	10.1	14.06	49.6	40.9	10.1
807	28.2	37.7	9.0	8.01	-	37.7	9.0
876	44.6	45.1	13.1	25.93	44.6	45.1	13.1
11	-	28.5	10.8	-	-	-	-
1124	-	26.1	5.0	-	-	26.1	5.0
1104	26.6	21.0	6.8	4.92	-	-	6.8
199	25.4	23.1	11.9	5.84	-	-	-
215	33.3	22.3	6.1	5.74	-	-	6.1
1103	-	18.7	3.3	-	-	18.7	3.3
184	-	21.8	12.7	-	-	21.8	12.7
186	26.2	24.6	7.1	5.96	-	24.6	7.1
864	25.5	26.8	7.2	-	-	-	-
353	21.8	16.1	4.7	1.68	21.8	16.1	4.7
520	25.0	32.1	6.7	-	-	-	-
1248	38.2	37.7	10.1	15.75	-	37.7	10.1
499	32.6	37.6	10.7	13.37	-	37.6	10.7
1119	-	16.6	4.3	-	-	16.6	4.3
555	25.0	14.5	4.6	1.69	25.0	14.5	4.6
1135	-	32.6	7.0	-	-	32.6	7.0
322	41.2	27.3	4.6	5.77	-	27.3	4.6
619	55.0	34.8	8.9	14.73	-	-	8.9
1467	38.4	37.4	5.4	8.92	-	37.4	5.4
21	48.1	41.2	7.0	13.64	48.1	41.2	7.0
7	57.2	47.6	6.2	12.26	-	47.6	6.2
1134	45.4	30.1	6.4	9.67	-	30.1	6.4
1145	40.1	27.7	5.4	5.76	40.1	27.7	5.4
55	31.5	12.5	7.8	3.17	-	-	-

CAT. NO.	TOOL LENGTH	TOOL WIDTH	TOOL THICKNESS	TOOL WEIGHT	BLANK LENGTH	BLANK WIDTH	BLANK THICKNESS
1146	-	12.7	6.5	-	-	12.7	6.5
337	-	16.1	3.5	1.37	-	16.1	3.5
408	23.7	20.8	4.5	1.93	23.7	20.8	4.5
466	-	25.5	4.0	-	-	25.5	4.0
482	29.7	22.2	6.2	4.67	-	22.2	6.2
769	34.7	26.0	8.3	7.21	-	-	8.3
809/1327	31.0	23.1	2.7	2.44	-	-	-
1122	49.8	31.8	8.5	16.56	-	31.8	8.5
1128	29.2	21.2	3.9	2.98	-	-	3.9
213	43.5	25.5	9.4	10.23	-	-	9.4
473	11.8	14.4	1.9	0.56	-	14.4	1.9
1118	18.2	10.2	1.6	0.53	-	10.2	1.6
1395	-	-	1.5	-	-	-	-
406	38.2	26.3	7.8	10.71	-	-	7.8
815/1336	30.1	21.4	3.0	3.04	30.1	-	3.0
6	46.9	48.7	8.3	28.49	-	-	-
1127	77.0	35.2	7.5	19.87	77.0	35.2	7.5
1136	34.4	25.4	5.9	6.98	-	-	-
1144	54.4	33.2	9.3	12.22	54.4	33.2	9.3
214	36.7	21.8	10.3	8.29	-	-	10.3
748	30.7	24.6	5.5	3.82	-	-	-

CAT. NO.	BLANK WEIGHT	CORTEX	WEATHERED SURFACE	LATERAL EDGE	EXPANSION	SCAR #
1126	-	Absent	Absent	Expanding	-	-
836	-	Absent	Absent	Expanding	-	2
1460	30.00	Proximal & Distal	Other Location	Parallel	-	0
1108	-	Absent	Other Location	Expanding	27.5	1
420	-	Right Lateral	Left Lateral	Expanding	52.5	0
193/1141	15.21	Absent	All-Over	Expanding	72.5	0
351	-	Left Lateral	Absent	Expanding	-	2
174	-	Absent	Absent	Expanding	-	3
321	-	Absent	Absent	Expanding	-	4
1137	-	Absent	Absent	Expanding	-	4
14	39.79	Absent	Right Lateral	Expanding	52.5	2
17	24.78	Absent	Other Location	Contracting	-	3
867	-	Absent	Absent	Expanding	-	3
1101	-	Absent	Left Lateral	Expanding	-	-
188	-	Absent	Absent	Expanding	-	4
281	-	Absent	Left Lateral	Expanding	-	3
393	-	Absent	Absent	Expanding	-	-
405	-	Absent	Absent	Expanding	-	3
453	-	Absent	Absent	Expanding	-	-
656	-	Absent	Absent	Expanding	42.5	2
862	-	Absent	Absent	Expanding	-	-
1249	-	Absent	Right Lateral	Expanding	-	1
1106	-	Absent	Other Location	Expanding	-	1
16	-	Absent	All-Over	-	-	0
1102	-	Left Lateral	Right Lateral	Expanding	-	1
241	-	Absent	Right Lateral	Expanding	37.5	1
211	-	Absent	Absent	Expanding	-	1
1105	-	Absent	Absent	Expanding	-	4

CAT. NO.	BLANK WEIGHT	CORTEX	WEATHERED SURFACE	LATERAL EDGE	EXPANSION	SCAR #
1218	-	Absent	Absent	Expanding	42.5	4
185	-	Absent	Absent	Expanding	42.5	4
216	-	Absent	Absent	Expanding	57.5	4
276	-	Absent	Absent	Expanding	47.5	4
345	-	Absent	Absent	Expanding	37.5	4
4	-	Absent	Absent	Expanding	-	5
404	-	Absent	Absent	Expanding	42.5	4
1125	-	Absent	Absent	Expanding	22.5	3
170	1.11	Absent	Absent	Expanding	-	5
360	-	Absent	Absent	Expanding	42.5	5
219/319	3.61	-	-	-	-	6
38	-	Absent	Absent	Expanding	-	5
20	-	Absent	Absent	Expanding	-	-
10	-	Absent	Absent	Expanding	27.5	4
462	-	Absent	Absent	Expanding	-	-
1143	-	Absent	Absent	Parallel	-	3
187	-	Absent	Absent	-	-	-
347	-	Absent	Absent	Parallel	-	-
775/1310	-	-	-	Parallel	-	-
9	-	Absent	Absent	Parallel	-	-
5	-	Left Lateral	Right Lateral	Parallel	-	1
53	-	Absent	Absent	Expanding	-	3
343	-	Absent	Right Lateral	-	-	-
22	-	Absent	All-Over	Expanding	-	0
395	-	Absent	Left Lateral	Expanding	-	2
1142	-	Left Lateral	Absent	Expanding	37.5	3
31	-	Absent	Absent	-	-	-
1123	-	Absent	Absent	Expanding	-	4

CAT. NO.	BLANK WEIGHT	CORTEX	WEATHERED SURFACE	LATERAL EDGE	EXPANSION	SCAR #
649	5.75	Absent	Absent	Expanding	62.5	6
788/799	14.06	Absent	Absent	Expanding	-	5
807	-	Absent	Absent	Expanding	62.5	-
876	25.93	Absent	Left Lateral	Expanding	57.5	3
11	-	Absent	Absent	-	-	3
1124	-	Absent	Right Lateral	Expanding	-	4
1104	-	Absent	Right Lateral	Expanding	-	-
199	-	Absent	Absent	Expanding	-	-
215	-	Absent	Absent	Expanding	-	-
1103	-	Absent	Absent	Expanding	-	-
184	-	Absent	Left Lateral	Expanding	17.5	1
186	-	Absent	Absent	Expanding	-	1
864	-	Absent	Absent	-	-	-
353	-	Absent	Absent	Expanding	-	-
520	-	-	-	-	-	-
1248	-	Left Lateral	Right Lateral	Expanding	-	2
499	-	-	Other Location	-	-	-
1119	-	Absent	Absent	-	-	3
555	1.69	Right Lateral	Absent	Expanding	47.5	2
1135	-	Absent	Absent	Expanding	-	-
322	-	Absent	Absent	Expanding	-	5
619	-	Absent	Absent	Expanding	-	4
1467	-	Absent	Absent	Expanding	27.5	2
21	13.64	Absent	Absent	Expanding	32.5	4
7	-	Absent	Absent	-	-	2
1134	-	Absent	Absent	Expanding	52.5	5
1145	5.76	Absent	Absent	Expanding	62.5	5
55	-	Absent	Other Location	-	-	-

CAT. NO.	BLANK WEIGHT	CORTEX	WEATHERED SURFACE	LATERAL EDGE	EXPANSION	SCAR #
1146	-	Absent	All-Over	Parallel	-	0
337	-	Absent	Absent	-	-	-
408	1.93	Absent	Absent	-	-	-
466	-	Absent	Absent	-	-	-
482	-	Absent	Absent	Expanding	-	3
769	-	Absent	Absent	Expanding	-	4
809/1327	-	Absent	Absent	Expanding	-	-
1122	-	Absent	Absent	Expanding	-	-
1128	2.98	Absent	Absent	Expanding	-	3
213	-	Absent	Absent	Expanding	-	1
473	-	Absent	Absent	Expanding	62.5	4
1118	-	Absent	Absent	Parallel	-	-
1395	-	Absent	Absent	-	-	-
406	-	Absent	Other Location	-	-	-
815/1336	3.04	Absent	Distal End	Expanding	-	2
6	-	Absent	Absent	Expanding	-	8
1127	19.87	Distal End	Absent	Expanding	42.5	3
1136	-	Absent	All-Over	-	-	1
1144	12.22	Left Lateral	Proximal End	Expanding	27.5	4
214	-	Absent	Other Location	Expanding	32.5	0
748	-	Absent	Absent	Expanding	-	3

CAT. NO.	SCAR ORIENTATION	CURVATURE PLACEMENT	TRANSVERSE SECTION	CORE FACET ANGLE	PLATFORM
1126	-	-	Offset Triangular	147.50	Present
836	Parallel	-	-	-	Present
1460	-	Not Applicable	Convex-Plano	-	Incomplete
1108	Unidirectional-Parallel	Distal	Trapezoid	-	Present
420	-	-	Convex-Plano	90.00	Absent
193/1141	-	Not Applicable	Convex-Plano	-	Present
351	Bidirectional-Parallel	Symmetrical	Offset Triangular	112.50	Present
174	Parallel	Symmetrical	Triangular	142.50	Present
321	Bidirectional-Parallel	Symmetrical	Convex-Trapezoid	-	Present
1137	Transverse	Symmetrical	Plano-Convex	-	Incomplete
14	Bidirectional-Parallel	Not Applicable	Other	-	Present
17	Bidirectional-Parallel	Symmetrical	Offset Triangular	117.50	Present
867	Bidirectional-Parallel	Distal	Triangular	137.50	Present
1101	-	-	Offset Triangular	152.50	Absent
188	Bidirectional	-	Offset Triangular	127.50	Incomplete
281	Complex	Not Applicable	Convex-Plano	-	Absent
393	Transverse	Symmetrical	-	-	Absent
405	Complex	-	Plano-Convex	-	Absent
453	-	Symmetrical	Triangular	-	Absent
656	-	-	-	112.50	Present
862	-	Symmetrical	Offset Triangular	135.00	Incomplete
1249	Unidirectional-Parallel	-	Offset Triangular	112.50	Present
1106	Unidirectional-Parallel	Symmetrical	Wedge	95.00	Incomplete
16	-	Symmetrical	-	-	Absent
1102	Unidirectional-Parallel	Distal	Offset Triangular	117.50	Absent
241	Unidirectional-Parallel	Symmetrical	Offset Triangular	107.50	Present
211	-	Symmetrical	Convex-Plano	-	Incomplete
1105	Bidirectional-Convergent	Symmetrical	Plano-Convex	-	Absent

CAT. NO.	SCAR ORIENTATION	CURVATURE PLACEMENT	TRANSVERSE SECTION	CORE FACET ANGLE	PLATFORM
1218	Bidirectional-Convergent	Symmetrical	Plano-Convex	-	Present
185	Bidirectional-Convergent	Symmetrical	Offset Triangular	147.50	Present
216	Bidirectional-Convergent	Symmetrical	Plano-Convex	-	Present
276	Bidirectional-Convergent	Symmetrical	Triangular	132.50	Present
345	Bidirectional-Parallel	Symmetrical	Triangular	147.50	Present
4	Bidirectional-Convergent	Symmetrical	Plano-Convex	-	Absent
404	Bidirectional-Convergent	Symmetrical	Triangular	122.50	Present
1125	Unidirectional-Parallel	Not Applicable	Trapezoid	-	Absent
170	Bidirectional-Convergent	Symmetrical	Triangular	-	Present
360	Bidirectional-Convergent	Symmetrical	Plano-Convex	-	Present
219/319	Transverse	Proximal	Plano-Convex	-	Present
38	Transverse	Symmetrical	Plano-Convex	-	Present
20	Unidirectional-Parallel	Distal	Triangular	142.50	Absent
10	Bidirectional-Convergent	Symmetrical	Offset Triangular	142.50	Present
462	-	Symmetrical	Plano-Convex	-	Absent
1143	Unidirectional-Parallel	Not Applicable	Triangular	-	Absent
187	-	Not Applicable	Plano-Convex	-	Absent
347	-	Not Applicable	Triangular	137.50	Absent
775/1310	-	Not Applicable	Triangular	-	Absent
9	Parallel	Not Applicable	Plano-Convex	-	Absent
5	Unidirectional-Parallel	Symmetrical	Trapezoid	112.50	Absent
53	Unidirectional-Parallel	Distal	Triangular	147.50	Absent
343	Parallel	Not Applicable	-	-	Absent
22	-	Distal	-	-	Incomplete
395	Parallel	Distal	Offset Triangular	102.50	Absent
1142	Bidirectional-Parallel	Distal	Wedge	117.50	Absent
31	-	-	-	-	Absent
1123	Bidirectional-Convergent	Symmetrical	Offset Triangular	-	Incomplete

CAT. NO.	SCAR ORIENTATION	CURVATURE PLACEMENT	TRANSVERSE SECTION	CORE FACET ANGLE	PLATFORM
649	Bidirectional-Convergent	Symmetrical	Triangular	132.50	Present
788/799	Bidirectional-Convergent	Symmetrical	Triangular	152.50	Present
807	-	-	Triangular	152.50	Present
876	Bidirectional-Parallel	Symmetrical	Offset Triangular	122.50	Present
11	Unidirectional-Parallel	Distal	Triangular	142.50	Absent
1124	Bidirectional-Parallel	Distal	Offset Triangular	107.50	Absent
1104	Parallel	Distal	Trapezoid	-	Absent
199	-	-	Trapezoid	-	Absent
215	Parallel	-	Plano-Convex	-	Absent
1103	-	Not Applicable	Plano-Convex	-	Absent
184	Unidirectional-Parallel	Distal	Triangular	92.50	Absent
186	Parallel	Symmetrical	Other	-	Present
864	Parallel	Symmetrical	Other	-	Incomplete
353	-	-	Plano-Convex	-	Present
520	-	-	Plano-Convex	-	Absent
1248	Complex	Distal	Wedge	110.00	Absent
499	Unidirectional-Parallel	Not Applicable	Plano-Convex	-	Absent
1119	Unidirectional-Parallel	Not Applicable	Triangular	137.50	Absent
555	Unidirectional-Parallel	Distal	Offset Triangular	112.50	Present
1135	Bidirectional-Parallel	Symmetrical	Plano-Convex	-	Absent
322	Transverse	Symmetrical	Plano-Convex	-	Present
619	Bidirectional	Not Applicable	Plano-Convex	-	Present
1467	Unidirectional-Parallel	Not Applicable	Offset Triangular	132.50	Present
21	Bidirectional-Parallel	Symmetrical	Offset Triangular	152.50	Present
7	Unidirectional-Parallel	Not Applicable	Offset Triangular	152.50	Present
1134	Bidirectional-Parallel	Symmetrical	Triangular	152.50	Present
1145	Bidirectional-Convergent	Symmetrical	Triangular	147.50	Present
55	-	-	Plano-Convex	-	Present

CAT. NO.	SCAR ORIENTATION	CURVATURE PLACEMENT	TRANSVERSE SECTION	CORE FACET ANGLE	PLATFORM
1146	-	Not Applicable	Triangular	90.00	Absent
337	-	Symmetrical	Plano-Convex	-	Present
408	-	-	-	-	Absent
466	-	-	-	-	Absent
482	Complex	Symmetrical	Plano-Convex	-	Absent
769	Unidirectional-Parallel	-	Plano-Convex	-	Absent
809/1327	-	-	-	-	Absent
1122	Bidirectional-Convergent	Symmetrical	Plano-Convex	-	Absent
1128	Bidirectional-Parallel	Symmetrical	Triangular	157.50	Absent
213	Parallel	-	Offset Triangular	-	Present
473	Bidirectional-Convergent	Symmetrical	-	-	Present
1118	-	Not Applicable	Plano-Convex	-	Absent
1395	-	-	-	-	Absent
406	Bidirectional-Parallel	Not Applicable	Convex-Plano	-	Absent
815/1336	Bidirectional-Parallel	Symmetrical	Plano-Convex	-	Present
6	Complex	Symmetrical	Plano-Convex	-	Absent
1127	Unidirectional-Parallel	Symmetrical	Offset Triangular	147.50	Present
1136	-	Not Applicable	-	-	Absent
1144	Distal-Parallel	Symmetrical	Wedge	90.00	Present
214	Parallel	Distal	Triangular	90.00	Absent
748	Complex	Symmetrical	Plano-Convex	-	Absent

CAT. NO.	PLATFORM PREPARATION	PLATFORM LENGTH	PLATFORM WIDTH	PLATFORM ANGLE	BULB
1126	Faceted, reduced, ground	12.6	4.4	67.50	Moderate
836	-	-	-	-	-
1460	Cortical	-	-	-	Pronounced
1108	-	-	-	-	-
420	-	-	-	-	-
193/1141	Plain, reduced	12.8	4.4	87.50	Pronounced
351	Plain, reduced	9.1	3.4	67.50	Diffuse
174	Plain	14.2	6.6	72.50	Pronounced
321	Plain, reduced	4.7	2.2	87.50	Pronounced
1137	Faceted, reduced, ground	-	2.0	62.50	Moderate
14	Plain, reduced	33.7	11.5	87.50	Pronounced
17	Dihedral	25.5	12.1	67.50	Pronounced
867	Dihedral, reduced	17.2	6.9	67.50	Moderate
1101	-	-	-	-	-
188	-	-	-	-	-
281	-	-	-	-	-
393	-	-	-	-	Pronounced
405	-	-	-	-	-
453	-	-	-	-	-
656	Plain	11.9	6.8	87.50	Diffuse
862	-	-	-	-	Moderate
1249	Cortex, reduced	7.1	5.3	82.50	Moderate
1106	Plain, reduced	-	5.2	82.50	Pronounced
16	-	-	-	-	-
1102	-	-	-	-	Diffuse
241	Faceted, ground	10.0	4.1	77.50	Moderate
211	-	-	-	77.50	Pronounced
1105	-	-	-	-	Diffuse

CAT. NO.	PLATFORM PREPARATION	PLATFORM LENGTH	PLATFORM WIDTH	PLATFORM ANGLE	BULB
1218	Faceted, ground	5.6	1.8	42.50	Moderate
185	Faceted, reduced, ground	9.9	2.8	47.50	Diffuse
216	Faceted, ground	8.1	3.0	42.50	Diffuse
276	Faceted, reduced, ground	10.0	2.4	37.50	Diffuse
345	Faceted, reduced, ground	10.4	3.6	67.50	Diffuse
4	-	-	-	-	-
404	Faceted, reduced, ground	9.3	2.7	52.50	Moderate
1125	-	-	-	-	-
170	Faceted, reduced, ground	-	-	-	Moderate
360	Isolated, faceted, ground	-	-	-	-
219/319	Isolated, faceted, reduced, ground	5.2	1.8	37.50	Diffuse
38	Isolated, faceted, reduced, ground	9.8	3.2	32.50	Diffuse
20	-	-	-	-	-
10	Faceted, reduced, ground	5.8	1.3	62.50	Diffuse
462	-	-	-	-	Diffuse
1143	-	-	-	-	-
187	-	-	-	-	-
347	-	-	-	-	-
775/1310	-	-	-	-	-
9	-	-	-	-	-
5	-	-	-	-	-
53	-	-	-	-	-
343	-	-	-	-	-
22	-	-	-	-	-
395	-	-	-	-	-
1142	-	-	-	-	-
31	-	-	-	-	-

CAT. NO.	PLATFORM PREPARATION	PLATFORM LENGTH	PLATFORM WIDTH	PLATFORM ANGLE	BULB
1123	Faceted, reduced	-	-	-	Moderate
649	Faceted, reduced, ground	14.1	3.7	47.50	Diffuse
788/799	Faceted, ground	11.0	2.7	42.50	Diffuse
807	Faceted, reduced, ground	6.6	2.5	52.50	Moderate
876	Faceted, reduced, ground	12.0	2.3	72.50	Moderate
11	-	-	-	-	-
1124	-	-	-	-	-
1104	-	-	-	-	-
199	-	-	-	-	-
215	-	-	-	-	-
1103	-	-	-	-	-
184	-	-	-	-	Moderate
186	Plain, reduced	6.4	3.5	67.50	Moderate
864	-	-	-	-	Moderate
353	Plain, reduced	3.5	2.0	77.50	Diffuse
520	-	-	-	-	-
1248	-	-	-	-	-
499	-	-	-	-	-
1119	-	-	-	-	-
555	Plain	6.5	2.4	77.50	Moderate
1135	-	-	-	-	-
322	Isolated, faceted, reduced, ground	17.4	8.1	47.50	Diffuse
619	Plain, reduced	10.9	7.2	87.50	Pronounced
1467	Cortex, reduced	13.6	5.1	77.50	Moderate
21	Plain, reduced	14.5	6.0	77.50	Moderate
7	-	-	-	-	-
1134	Faceted, ground	6.1	2.9	52.50	Diffuse

CAT. NO.	PLATFORM PREPARATION	PLATFORM LENGTH	PLATFORM WIDTH	PLATFORM ANGLE	BULB
1145	Faceted, reduced, ground	8.0	2.5	47.50	Diffuse
55	-	-	-	-	-
1146	-	-	-	-	-
337	-	-	-	-	-
408	-	-	-	-	-
466	-	-	-	-	-
482	-	-	-	-	-
769	-	-	-	-	-
809/1327	-	-	-	-	-
1122	-	-	-	-	-
1128	-	-	-	-	-
213	Plain	5.5	3.7	82.50	-
473	Faceted, reduced, ground	4.6	1.1	-	-
1118	-	-	-	-	-
1395	-	-	-	-	-
406	-	-	-	-	-
815/1336	Plain, ground	14.4	5.2	72.50	Moderate
6	-	-	-	-	-
1127	Plain, ground, reduced	-	3.4	67.50	Diffuse
1136	-	-	-	-	-
1144	Plain, reduced	11.5	3.4	77.50	Moderate
214	-	-	-	-	-
748	-	-	-	-	-

AN EARLY PALEO-INDIAN SITE NEAR PARKHILL, ONTARIO

CHRISTOPHER ELLIS AND D. BRIAN DELLER

The first people who came to southern Ontario, just after 11,000 years ago, encountered a landscape much different from that of today. The great ice sheets were melting, feeding lakes that flooded many areas now dry. Conifers dominated the open woodland, much like the northern tree line in Canada, and animals now extinct or extirpated – mastodon, caribou, and Arctic fox – inhabited the area.

Known to archaeologists as Paleo-Indians, the people who lived here were among the most expert stone tool makers known anywhere. They obtained their stone raw materials some 200 km from Parkhill, and returned to this site seasonally to intercept migrating caribou. The setting, on the shore of a glacial lake next to a long narrow estuary, is reminiscent of site locations documented among caribou hunters in later times. Parkhill eventually became a very large site with several distinct activity areas. This volume provides a detailed description and analysis of all aspects of this important archaeological locality.

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